
**FINAL REMEDY
REMEDIAL INVESTIGATION
REPORT
MOTOROLA 52ND ST.**

**VOLUME IV OF IV
SOUTHWEST PARKING LOT
ATTACHMENT SW**

Prepared for

MOTOROLA INC.



by

Dames & Moore



February 1992



MOTOROLA INC.

March 16, 1992

Mr. Edward Z. Fox, Director
Ms. Jacqueline Maye, Project Coordinator
Arizona Department of Environmental Quality
2005 North Central Avenue
Phoenix, Arizona 85004

Final Remedy Remedial Investigation Report
Motorola 52nd St. Facility

Dear Mr. Fox and Ms. Maye:

Transmitted herewith is the Final Remedy Remedial Investigation Report, February 1992, prepared by Dames & Moore for the Motorola 52nd St. project. This document is submitted for your review pursuant to the general requirements of Article 27.0 of the Motorola 52nd St. Consent Order. This document supersedes the draft FR RI report transmitted under cover of our letter dated September 30, 1991, and responds to agency comments submitted under cover of the ADEQ letter dated February 18, 1992 (RPU92,072).

Motorola wishes to convey its intention to cooperate fully with the agencies to actively evaluate alternative remedial actions as required. In accordance with that, Motorola proposes to proceed with the development of the Final Remedy Feasibility Study and looks forward to meeting with agency representatives as soon as possible to discuss plans for proceeding.

In addition, Motorola is continuing to investigate and remediate the area of the Southwest Parking Lot to reduce concentrations of volatile organic compounds in the vadose zone and ground water. Attachment SW to the enclosed report presents the work completed through December 1991, and will be supplemented with additional information being obtained at this time. Motorola looks forward to meeting with agency representatives to review the work presently being performed and proposed in the Southwest Parking Lot.



MOTOROLA INC.

Mr. Edward Z. Fox, Director
March 16, 1992
Page 2

If you have any questions regarding this report, please call me or Mr. James R. Hussey with Dames & Moore.

Sincerely,

John Seeger
Project Coordinator

JS/tc

Enclosure

Received by:

Mr. Edward Z. Fox, Director

Date

Ms. Jacqueline Maye, Project Coordinator

Date

cc: See attached list

FINAL REMEDY REMEDIAL INVESTIGATION REPORT
February 19, 1992

MOTOROLA INC.

52nd Street and McDowell Road
Phoenix, Arizona

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March 16, 1992

09448-139-033

Mr. John Seeger
Project Coordinator
Motorola Inc.
5005 East McDowell Road
Phoenix, Arizona 85008

Dear John:

Please find enclosed the Final Remedy Remedial Investigation Report, February 1992, for the Motorola 52nd St. Superfund project. This document contains a comprehensive characterization of the extent of ground-water contamination for the Motorola 52nd St. facility. The report forms the basis for proceeding with a Final Remedy Feasibility Study.

This report supersedes the draft FR RI report transmitted to the Arizona Department of Environmental Quality under your cover letter dated September 30, 1991. This document reflects comments received from ADEQ under cover of letter dated February 18, 1992. The responses to general and specific comments on the draft report provided by ADEQ are included behind the main text of this report, and are reflected in changes to the text, tables and figures contained herein.

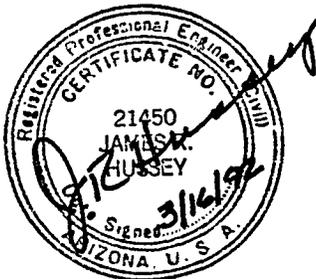
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Sincerely,

DAMES & MOORE



James R. Hussey, P.E.
Principal



JRH/tc

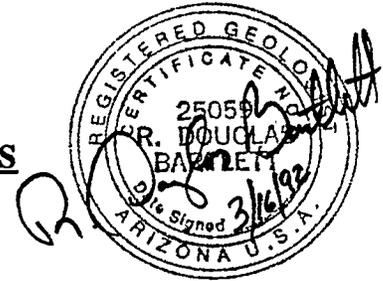
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FINAL REMEDY RI REPORT
MOTOROLA 52ND ST.

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FINAL REMEDY RI REPORT

MOTOROLA 52ND ST.

ATTACHMENT SW

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SOUTHWEST PARKING LOT (SWPL) INVESTIGATION

SW1.0 INTRODUCTION

Attachment SW presents a summary of the investigations conducted through December 1991 in the Southwest Parking Lot (SWPL) area of the Motorola 52nd St. Facility, Phoenix, Arizona. These ground-water, soil, and soil-gas studies were undertaken to evaluate the effect of potential volatile organic discharges in the area. The investigation and remediation continues (February 1992), and will be reported in more detail as results become available.

The purpose of this report is to provide the basis for recommendations for further actions to characterize the nature and effects of discharges, and to develop remedial action alternatives. These recommendations have been summarized for the Arizona Department of Environmental Quality (ADEQ) in the "Proposed Work Plan, Investigation and Remedial Action, Southwest Parking Lot (SWPL), Motorola 52nd St. Facility," dated February 3, 1992 (Dames & Moore, 1992).

SW1.1 BACKGROUND

The locations of the Motorola 52nd St. Facility and SWPL are shown on Figures SW1.1 and SW1.2, respectively. Locations of significant features in the SWPL area, including monitor wells, buildings, and storage facilities are shown on Figure SW1.3.

A chronology of events related to the SWPL at the 52nd St. Facility in particular is provided in Appendix SW-A. Investigations conducted prior to 1990 in the SWPL area included the following:

- Characterization of the local hydrogeology;
 - Installation of monitor wells MP 16, DM 107, DM 201, DM 201OB1, DM 201OB2, and DM 201OB3, and
 - Performance of an aquifer test using DM 201 as the pumping well and DM 201OB1, DM 201OB2, and DM 201OB3 as observation wells;
- Characterization of water quality through the collection and analysis of water samples from monitor wells MP 16, DM 107, and DM 201; and
- Identification and characterization of areas of potential discharge through
 - interviews and review of records,
 - soil-gas sample collection and analysis,
 - soil and ground-water sample collection and analysis, and
 - physical chemistry investigations.

Results of these investigations were presented in the 1987 Draft RI Report (Dames & Moore, 1987).

Results of soil-gas investigations conducted in the SWPL area during 1985 and 1989 are included in Appendix SW-B. These results indicated an area of higher tetrachloroethylene (PCE) concentrations in an area north of Building A-A and south and west of Building A-D, and an area of slightly higher trichloroethylene (TCE) concentrations in the north part of the SWPL. Based on the soil-gas data and the source investigation reviewed in Chapter SW3, the SWPL was targeted for further investigation and cleanup in the Motorola 52nd St. Consent Order (AG, 1989).

Analytical results for samples collected from SWPL monitor wells during the period from 1985 through 1991 are compiled in Appendix SW-C. Detected VOCs are summarized in Table SW1.1 for monitor well DM 201 for the period from August 1985 through January 1991. Notice that from January 1989 to October 1990, reported concentrations of 1,1,1-

trichloroethane (TCA) increased from less than 0.5 parts per billion (ppb) to 5,100 ppb, and 1,1-dichloroethylene (DCE) increased from about 15.6 to 1,710 ppb. This increase in VOC concentrations was confirmed by the sample collected from DM 201 during January 1991. During the spring of 1991, an investigation was initiated to evaluate the cause of the unexpected greater concentrations of VOCs, particularly TCA and DCE.

These data (October 1990 and January 1991) were presented to the ADEQ, the ADWR, and the EPA at a meeting on February 19, 1991. At this meeting, Motorola presented a preliminary scope of work. This scope was expanded and submitted to the agencies for their review and comment in the SWPL Task Specification (Dames & Moore, 1991). In addition, the agencies reviewed the preliminary work plan of proposed 1992 activities in a meeting on January 6, 1992. A work plan was submitted to the agencies on February 3, 1992 (Dames & Moore, 1992).

SW1.2 OBJECTIVES AND SCOPE OF WORK

The objectives of the SWPL investigation, as described in the SWPL Task Specification are to:

- Characterize the magnitude, extent, and source of VOCs observed in ground-water, soil, and soil gas; and
- Develop recommendations to remediate the VOC contamination.

To achieve these objectives, the following scope of work was conducted during 1991:

- Source investigation (Chapter SW3), including;
 - soil-gas sample collection and analysis, and
 - collection and analysis of soil samples from shallow soil borings;

- Evaluation of the extent of contamination (Chapter SW4), including;
 - collection and analysis of water quality samples,
 - collection and analysis of soil-gas samples,
 - installation and sampling of an offsite, downgradient monitor well (DM 701), and
 - measurement of water level elevations and estimation of the direction and rate of ground-water flow; and
- Evaluation of partial remedial action alternatives (Chapter SW5), including;
 - testing of existing monitor wells to estimate sustainable yields,
 - extraction of contaminated ground water from existing monitor wells, and
 - treatment of contaminated water on the Motorola 52nd St. Facility at the Pilot Treatment Plant.

The SWPL investigation is continuing at this time (February 1992). The objective of this report is to present the data collected through December 1991, and use these data to provide the basis for further investigation and remediation of the observed VOC contamination. Recommendations for further actions are presented in Chapter SW6.

SW2.0 SITE CONDITIONS

Site conditions, including descriptions of site features and hydrogeology, are presented in this chapter.

SW2.1 SITE FEATURES

Prior to occupation by Motorola Inc., the SWPL area was used for agricultural purposes. During 1991, the SWPL area, as shown on Figure SW1.3, included the following features:

- a fenced, asphalt area approximately 400 by 800 feet that is used for employee and contractor parking;
- Building A-D, where through December 1991, solvents such as TCA, Freon, and Xylenes were bottled (Chemix Room) and stored;
- Building A-D Expansion (built during 1988 and 1989), which is used to store and package caustics, acids, and other chemicals; and
- Bulk Storage Tanks where, through December 1991, solvents such as TCA, Freon, and Xylenes were loaded and stored.

Solvent storage in the Bulk Storage Tanks and solvent bottling in Building A-D was discontinued during December 1991.

SW2.2 HYDROGEOLOGY

The geologic setting and hydrogeology of the Final Remedy (FR) RI study area are summarized in Chapters 2 and 3, respectively, of the 1992 FR RI Report. The information presented in this section is intended to provide greater focus on the geologic setting and hydrogeology of the SWPL area.

SW2.2.1 Geologic Setting

A generalized stratigraphic column is provided on Figure SW2.1. Descriptions of geologic units, a bedrock geologic map, geologic cross sections, and a map of the elevation of the top of bedrock are provided in Chapter 2 of the 1992 FR RI Report. Locations of monitor wells and borings drilled in the SWPL area, through December 1991, are shown on Figures SW2.2 and SW2.3. Construction and geologic data associated with SWPL monitor wells and borings are summarized in Table SW2.1.

In the discussions that follow, the geologic units are divided into two groups based on similar hydrogeologic properties: 1) the alluvium; and 2) the bedrock. In the SWPL area, bedrock includes Precambrian metarhyolite and Precambrian granite. Alluvium includes all of the unconsolidated sediments that overlie the bedrock.

In the SWPL area, Quaternary alluvium overlies either Precambrian metarhyolite or Precambrian granite. The alluvium consists of silty sand to sandy gravel with varying amounts of clay and carbonate cementation. The metarhyolite is fine grained with a saccharoidal texture and is intensely fractured and brecciated at some locations including wells DM 201 and DM 201OB1 where attempts to core produced very poor recovery. The granite is coarse grained with grey quartz, biotite, and small white feldspars.

The depth to bedrock and the thickness of the alluvium generally increases from northeast to southwest from about 15 feet at boring 18DD, located north of the guard shack on the east side of the SWPL, to 50 feet at MP 16 in the southwest corner of the SWPL.

SW2.2.2 SWPL Monitor Wells and Borings

Monitor well and boring locations are shown on Figures SW2.2 and SW2.3. Monitor well construction is summarized in Table SW2.1. Five of the six on-site SWPL monitor

wells shown on Figure SW2.2 are conventional alluvial monitor wells that are screened across the contact between alluvium and bedrock. Monitor well MP 16 is a nested 4-level multi-port well with MP 16A (the shallowest port) screened in the alluvium, MP 16B screened across the alluvium/bedrock contact, and MP 16C and MP 16D screened in the bedrock.

The offsite SWPL area monitor wells are located south of Roosevelt Street, north of Van Buren Street, west of 50th Street, and east of 44th Street. Three of the six offsite monitor wells shown on Figure SW2.3 are conventional alluvial wells (DM 124, DM 503, and DM 701) that are screened across the contact between alluvium and bedrock. (Note that wells north of Roosevelt St. are shown for reference only.) Monitor well DM 123 is a Westbay™ multi-completion monitor well with one monitoring zone installed in the alluvium and five monitoring zones installed in the bedrock. Multi-port monitor wells MP 52 and MP 53 were plugged and abandoned during 1989 because of the impending construction of the Papago Freeway.

SW2.2.3 Ground-Water Conditions

Measurements of the depth to water made during February 1991 in onsite SWPL wells ranged from about 21 feet at monitor well DM 107 to about 32 feet in monitor well MP 16. These data indicate that the saturated thickness of the alluvium ranges from about 6 feet in the northern part of the SWPL to 18 feet in monitor well MP 16.

Water level elevation data for SWPL wells for the period from 1985 through 1991 are provided in Appendix SW-D. Hydrographs of water levels measured in onsite and offsite wells from 1985 through 1991 are shown on Figures SW2.4A and SW 2.4B, respectively. The water level elevations dropped by about 3 feet in monitor well DM 201 during the period from 1985 to 1991. The drop in water level elevations which was observed in the area is discussed in Chapter 4 and Appendix G of the 1991 FR RI Report.

Water level elevations measured in onsite SWPL wells on February 6, 1991 are contoured on Figure SW2.5. These contours indicate that the general direction of ground-water flow in the SWPL is toward the west-southwest with a gradient of approximately 0.05. The west-southwest direction of ground-water flow is consistent with the regional gradient shown on Figure SW2.6.

Results of an aquifer test conducted in monitor well DM 201 during 1985 are reported in the 1987 Draft RI Report and indicated that three layers of contrasting transmissivity were present. These layers consisted of a shallow zone above a depth of 27.5 feet, an intermediate zone from 27.5 to 46.5 feet, and a deep zone from 46.5 to 107 feet. Estimated transmissivities (T) and hydraulic conductivities (K) were reported to be:

Zone	Depth Interval (feet)	T (gpd/ft)	K (ft/day)
Shallow	above 27.5	340	7
Intermediate	27.5 to 46.5	11.3	0.08
Deep	46.5 to 107	0.34	0.0008

SW3.0 SOURCE INVESTIGATION

Based on the increase in VOC concentrations observed in monitor well DM 201 during October 1990, it was concluded that a recent discharge of volatile organics (as a solvent) may have occurred in the SWPL area. A source investigation was initiated to identify, characterize, and evaluate this potential discharge. The source investigation included the collection and analysis of soil-gas and soil samples. Results of the source investigation are presented in this chapter.

SW3.1 HISTORIC SOURCE INVESTIGATIONS (PRE 1991)

Locations of potential sources identified for the SWPL area in the 1987 Draft RI Report (Dames & Moore, 1987) are shown, generally, on Figure SW3.1. As noted in the Draft RI Report, and subsequently in the Remedial Action Plan (RAP) (Dames & Moore, 1988) and the 1989 Motorola 52nd St. Consent Order, three areas on the Facility were targeted for further investigation and cleanup. These include the SWPL area, which includes a former chemical storage area (Source 18) and two areas identified on the basis of soil-gas data (SV 1 and SV 2). The two other areas targeted for remediation were the Courtyard and the Acid Treatment Plant (ATP), see Figure SW1.2.

As part of the investigation of these and other potential sources, soil-gas samples were collected and analyzed during February/March 1985, and October/November 1985. Analytical results for these soil-gas investigations were presented and discussed in the 1987 Draft RI Report and are summarized for the SWPL area in Appendix SW-B. Also, Appendix SW-B includes the results of soil-gas samples collected and analyzed during January 1989 (Dames & Moore, 1989). These historic soil-gas data are provided for comparison with the soil-gas data obtained during 1991.

Conclusions reached in the 1987 Draft RI Report regarding VOC contamination at Potential Source 18 were:

- Free-phase solvent was not present in the vadose zone;
- VOC contamination may be present as a combination of vapor (present in pore air) and aqueous (dissolved in pore water);
- VOC contamination is present in the ground water in the dissolved phase and may be present in the form of small undissolved droplets below the water table.

It was also concluded that the soil-gas concentrations in the SV 1 and SV 2 areas could be related to VOC concentrations in the ground water rather than the presence of a VOC source in the vadose zone.

SW3.2 1991 SOURCE INVESTIGATION

Investigations conducted during 1991 to identify the source or sources of the TCA and DCE observed in ground water included two soil-gas studies and a soil sampling program. Locations of soil-gas samples collected during 1991 are shown on Figure SW3.2A and SW3.2B. Soil-gas samples were collected on:

- March 26 and 27, 1991 by Hydrogeochem Inc. of Tucson, Arizona (Hydro GeoChem, Inc., 1991), with oversight by Dames & Moore (referred to as March 1991 Soil-Gas Investigation); and
- October 28 through November 6, 1991 by Tracer Research Corporation of Tucson, Arizona (Tracer Research Corp., 1992), with oversight by Dames & Moore (referred to as the November 1991 Soil-Gas Investigation).

Soil-gas samples were collected from locations both onsite and offsite, and from locations adjacent, upgradient, and downgradient from monitor well DM 201.

Reported concentrations of TCA, DCE, PCE, TCE, vinyl chloride (VC), and Freon-113 are compiled in Appendices SW-E.4 and SW-E.5. Reported concentrations of TCA, DCE, PCE, and TCE are shown on Figures SW3.3A through SW3.6B. The following observations are based on these soil-gas data:

- Measured TCA concentrations ranged from not detected or as low as 0.0004 to 110,000 ug/l. The largest concentrations of TCA are located in the area outside of the southwest corner of Building A-D and around the southern part of the Bulk Storage Tank area. TCA in soil gas was measured at concentrations less than detection in the northern part of the SWPL and north of Building A-D Expansion.
- Measured TCA soil-gas concentrations were offsite at detection limits or at very low concentrations at locations of 200 feet or more southwest of the SWPL (Figure SW3.3B).
- Measured DCE concentrations ranged from 1.1 to 3,900 ug/l, and generally mirrored the concentration pattern of TCA.
- Measured PCE concentrations ranged from 0.002 to 7,600 ug/l. Although the concentration pattern is similar to TCA and DCE, the magnitude of PCE detected since before 1987 has not changed significantly.
- Measured TCE concentrations ranged from 0.1 to 6.74 ug/l. The largest concentrations were found in the northern part of the SWPL which indicates a pattern that is not similar to TCA, DCE, or PCE.

At some locations, in the area around the west end of Building A-D and west side of the Bulk Storage Tank area, TCA concentrations were large enough to mask DCE, PCE, TCE concentrations which were not quantified and reported as less than detection. Data indicated by the designation NQ (not quantifiable) are not to be considered valid.

The soil-gas data indicated a recent potential discharge of TCA and DCE in the vicinity of Building A-D and the Bulk Storage Tanks. These areas were further investigated by testing soil samples collected from borings drilled outside Building A-D and around the Bulk Storage Tank area. These soil samples were collected during May 1991 at the locations shown

on Figure SW3.7. These borings were drilled to depths of 10 to 15 feet; soil samples were analyzed for VOCs using EPA Methods 8010 and 8020. Analytical results, which are provided in Appendix SW-E.1 and SW-E.2, and shown on Figure SW3.8, indicate that significant contamination, indicative of a recent discharge, was not encountered.

During December 1991, the concrete floor was cored and soil samples were collected to a depth of about 3 feet below the bottom of a sump located in Building A-D. The approximate location of the sump in the solvent bottling and handling area is shown on Figure SW3.9. The sump is approximately 4 feet deep, 3 feet wide, and 7 feet long, and constructed of concrete reinforced with rebar. Chemicals bottled in this room include TCA, Freon, and xylene. Analytical results are provided in Appendix SW-E.3, and are summarized on Figure SW3. As indicated on Figure SW3.9, total VOCs in excess of 30,000 mg/kg were detected in soil from below the sump.

SW4.0 EXTENT OF VOCs IN GROUND WATER AND SOIL GAS

The patterns of VOC concentrations detected in the soil gas and in the ground water provide the basis for defining the extent of VOCs in ground water. Analytical results for water quality samples collected from SWPL area monitor wells are provided in Appendix SW-C. Concentrations of TCA, DCE, PCE, and TCE observed in the most recent samples collected from SWPL wells are shown on Figure SW4.1 for onsite wells and Figure SW4.2 for offsite wells.

The following observations about the extent of VOCs in ground water are based on the water quality data:

1. Principal contaminants include TCA, DCE, PCE, and TCE.
2. Largest concentrations of TCA, DCE, and PCE occur in monitor well DM 201OB1.
3. Steep concentration gradients exist for TCA, DCE, and PCE in the vicinity of monitor well DM 201. For example: TCA concentrations decline from east to west from approximately 22,000 ppb to 1,700 ppb to 10 ppb from monitor wells DM 201OB1 to DM 201 to DM 201OB3, respectively.
4. TCA, DCE, and PCE were less than or near detection in monitor well DM 107. Reported TCE concentrations in monitor well DM 107 ranged from 6.7 to 50.8 ppb during 1991.
5. TCA concentrations were less than detection in the most recent samples collected from all offsite wells, shown on Figure SW4.2.
6. All VOC concentrations were less than detection in the most recent samples collected from monitor well DM 701.

The patterns of VOC soil-gas concentrations provide a basis for defining the extent of VOCs in ground water. The estimated position of the 20 ug/l soil-gas concentration contour is shown on Figures SW3.3A, SW3.3B, SW3.4A, SW3.4B, SW3.5A, and SW3.5B for TCA, DCE, and PCE. Note that the concentration of 20 ug/l in soil gas has no regulatory

significance for these compounds. The selection of this concentration contour was arbitrary, and selected solely to depict a pattern of potential VOC migration. These soil-gas patterns when evaluated in conjunction with the water quality data indicate that:

- VOCs in soil gas and ground water are migrating in a southwest direction, similar to the direction of ground-water flow;
- VOCs in soil gas extend southwest of the southern boundary of the SWPL, but do not appear to extend as far south as the Papago Freeway (under construction);
- VOCs in ground water may extend southwest of the southern boundary of the SWPL; and
- Monitor well DM 701 appears to be located downgradient from the area where VOCs are observed in soil gas and ground water.

This leads to the conclusion that additional monitor wells to define the downgradient extent of VOCs in ground water should be located south of the southern boundary of the SWPL, northeast of DM 701 and the Papago Freeway. Also, additional soil-gas samples should be collected from the southern part of the SWPL, and in the area south of Roosevelt Street, to better locate any additional monitor wells. Any ongoing work, such as discussed here, is addressed in the SWPL work plan (Dames & Moore, 1992) and is reviewed in Chapter SW6.0.

SW5.0 REMEDIAL ACTIONS CONDUCTED DURING 1991

Remedial actions conducted during 1991 included pumping of monitor wells DM 201 and DM 201OB1. These wells were pumped at a total rate of about 3 to 6 gpm on an intermittent basis (up to about 40 hours per week). The objectives of this program were to:

- Collect and analyze samples and evaluate the changes in concentration;
- Provide additional data to evaluate the extent of contamination; and
- Recover and treat contaminated ground water.

Monitor well DM 201 was pumped continuously for about 2 days during February 1991 to estimate a sustainable yield. Based on this test, it was concluded that monitor well DM 201 would yield approximately 3 gpm.

Pumping began on March 13, 1991, and June 28, 1991, for monitor wells DM 201 and DM 201OB1, respectively. Pumping data for monitor wells DM 201 and DM 201OB1 are summarized in Appendix SW-F. As of December 31, 1991, a total of about 200,000 gallons of water had been produced from DM 201 and about 120,000 gallons of water had been produced from DM 201OB1. Produced water was contained in lined tank trucks and transferred to the Pilot Treatment Plant (PTP) for treatment.

Each well was sampled periodically for VOCs. A total of 29 samples were collected from monitor well DM 201, and 18 samples were collected from monitor well DM 201OB1 during the period from March 11 through December 31, 1991. These samples were analyzed for VOCs using EPA Method 601; the data are provided in Appendix SW-C.

Concentrations versus time of TCA, DCE, the sum of TCA+DCE, the ratio of TCA to DCE, and total VOCs, are plotted for monitor wells DM 201 and DM 2010B1 on Figures SW5.1 through SW5.5. These plots indicate the following trends:

- Total VOC concentrations declined during the period from March to December 1991 from approximately 8,000 to 4,000 ppb in DM 201 and from approximately 60,000 to 45,000 ppb in DM 2010B1;
- The ratio of TCA to DCE has decreased from about 1.75 to 1.25 in DM 2010B1, and from about 3.0 to 1.0 in DM 201 whereas TCA+DCE has not changed significantly,
- TCA concentrations have declined in both wells;
- DCE concentrations have remained relatively constant.

A potential mechanism to explain the decreasing ratio of TCA/DCE would be abiotic degradation of TCA to DCE as discussed in Chapter 4 of the 1992 FR RI Report.

The pumping program is ongoing and current plans are to also pump from DM 2010B2. Based on mean total VOC concentrations of approximately 6,000 and 50,000 ppb and total volumes pumped of 200,000 and 120,000 gallons for DM 201 and DM 2010B1, it is estimated that about 60 pounds of VOCs have been recovered through December 31, 1991 as a result of pumping these two wells.

SW6.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions were developed from the results of the investigation of the SWPL conducted during 1991:

1. Concentrations of TCA and DCE in both the ground water and soil gas increased significantly in the SWPL area during the period from 1989 to 1990.
2. One potential source, the sump in the Chemix room of Building A-D, was identified on the basis of soil samples collected from below the sump.
3. Soil-gas data indicate the possibility that ground-water contamination extends south of the SWPL.
4. Water quality and soil-gas data indicate that VOC contamination in the ground water does not extend to offsite monitor well DM 701.

In summary, results of the work conducted during 1991 indicate the need to conduct additional investigations to identify and evaluate the source and extent of VOC migration. To this end, a combined investigation and remedial action program was initiated in January 1992. The primary components of these recommendations were reviewed with the ADEQ and the ADWR during a meeting on January 6, 1992. These recommendations were subsequently summarized in "Proposed Work Plan, Investigation and Remedial Action, Southwest Parking Lot (SWPL), Motorola 52nd St. Facility," dated February 3, 1992. Implementation of the program began with the installation of additional ground-water extraction wells on January 11, 1992. Depending on the results of detailed studies that comprise the initial phases of the program, only some of these activities may be undertaken. In order to expedite cleanup, Motorola has begun further investigation coincident with the implementation of the first part of the remediation plan. This plan is flexible and will be altered or refined based on the results of initial, detailed studies such as test results from soil samples, soil-gas data, and further ground-water testing.

The major components of the program include:

1. **SOURCE INVESTIGATION AND REMEDIATION** - Motorola proposes to investigate the potential presence of solvents in soil in the vadose zone in the immediate vicinity of the sump in Building A-D, in the ground water beneath that general area and in the vadose zone and ground water immediately downgradient. This investigation would be conducted in an area generally to the southwest of the sump through a combination of borings, water quality sampling, and soil-gas exploration. This will necessitate the drilling of borings and the collection of soil-gas samples in the subsurface beneath the concrete slab in Building A-D. Analytical results from soil samples and water quality samples would be evaluated on a fast turnaround basis, and borings would be designed, if possible, to be converted to ground-water extraction wells or soil-vapor extraction wells.

2. **ONSITE CONTAINMENT THROUGH GROUND-WATER EXTRACTION WELLS.** Soil-gas data presented herein indicate the potential for elevated VOC concentrations in ground water migrating generally to the southwest or south-southwest from the Building A-D area across the SWPL to south of Roosevelt Street. In an attempt to contain ground waters with elevated TCA and DCE concentrations, Motorola proposes to install a series of four to as many as ten ground-water extraction wells parallel to Roosevelt Street on the southern boundary of the SWPL. It is believed that these wells will penetrate about 30 to 40 feet of saturated alluvium and fractured bedrock, and be terminated in bedrock at depths of 60 to 70 feet. The full extent of this well field will be defined by measurements taken during the installation of these extraction wells.

Several options exist for treatment of water extracted from these wells depending upon institutional constraints. At present, it is believed that ground water extracted from this well system will be conveyed by a common pipe to the existing dual-containment pipeline onsite that leads to the onsite Integrated Ground-water Treatment Plant (IGWTP). Water from the IGWTP will be used in manufacturing processes after further treatment in the Motorola reverse osmosis deionized (RO/DI) water system on site.

3. **SOIL VAPOR EXTRACTION.** As noted in Appendix C of the Motorola 52nd St. Consent Order, soil-gas extraction is targeted for remediation of TCE and PCE in the vadose zone in the SWPL. Depending on results from the source investigation (soil tests and soil-gas results), a soil vapor extraction (SVE) system would be designed and installed near the source area and/or in the southern part of the Southwest Parking Lot.

4. **OFFSITE INVESTIGATION.** The results of soil-gas testing south of Roosevelt Street indicate the possibility of VOCs in ground-water in that area. Therefore, four to six ground-water monitor wells will be installed on Phoenix Union High School District (PUHSD) property to investigate the extent of VOC migration. The wells will be designed so that they could be converted to extraction wells should that prove feasible and necessary. During this program, Motorola will also continue to monitor well DM 701, which is located downgradient (generally) of the SWPL along 48th Street.

SW7.0 REFERENCES

- Attorney General's Office, 1989. 52nd St./Complaint, Consent Order and Settlement Agreement, Civil Action No. 89-16807, June 20, 1989.
- Dames & Moore, 1987. Draft Remedial Investigation/Feasibility Study, June 1, 1987.
- _____, 1988. Draft Remedial Action Plan, June 24, 1987.
- _____, 1989. Submittal No. 3, 30 Percent Design Packages MI52 Consent Order, March 15, 1990.
- _____, 1991. Task Specification - Ground-Water Investigation, SWPL, April 19, 1991.
- _____, 1992. Proposed Work Plan Investigation and Remedial Action, Southwest Parking Lot (SWPL), Motorola 52nd St. Facility, February 3, 1992.
- Hydro Geochem, Inc., 1991. Soil Gas Survey of Motorola SWPL, April 10, 1991.
- Tracer Research Corp., 1992. Shallow Soil Gas Investigation Motorola 52nd Street Facility, Southwest Parking Lot (SWPL) Area, Phoenix, Arizona (October 29-November 24, 1991), March 3, 1992.

TABLES

Table SW1.1

**HISTORIC (PRE 2/91) VOC CONCENTRATIONS
IN DM 201 (in ppb)**

Volatile Organic Compounds	8/85^(a)	1/89^(a)	10/90^(a)	1/91^(a)
1,1-Dichloroethane (DCA)	<1	<1	50	170
1,1-Dichloroethene (DCE)	32.6	15.6	1,710	2,100
1,2-Dichloroethene (Total)(TDCE)	<1	<1	<10	50
Tetrachlorethene (PCE)	56	214	440	580
1,1-Trichloroethane (TCA)	80	<0.5	5,100	5,300
Trichloroethene (TCE)	241	3.7	25	45

^(a) Results presented in Appendix SW-C

Table SW2.1

SWPL MONITOR WELLS AND BORINGS

Well/Boring	ADWR File/Reg. Numbers	Elevations		Measurement Point	Completion Date	Completion Interval(s) (ft)	Drilling Method	Casing Description	Depth to Formation Top (ft) ¹						Total Depth Drilled (ft)
		Land Surface (ft)	Measure. Point (ft)						Cal	Tv	Tib	Tcf	Pcg	Pcmr	
DM 107	(A-1-4)5bca 55-513169	1199.20	1198.20	Top of casing	1/22/86	13.0 - 33.1	Hollow stem auger	0-30.1' Schedule 80 4" PVC	0				26.0		33.8
DM 108	N/A N/A	N/A	N/A	N/A	1/31/86	N/A	Hollow stem auger	N/A	0				18.5		19.3
DM 123	(A-1-4)6dcb 55-514882	1158.30	1157.57	Top of 1.5" Westbay PVC casing	8/22/86	49.5 - 66.0 68.3 - 91.6 94.6 - 126.6 129.6 - 141.6 144.6 - 166.6 189.6 - 206.6 209.6 - 241.6 244.6 - 256.6 279.6 - 300.0	Conventional mud rotary	0-4' 8" Steel 0-68.3' 4" Steel 0-295' 1.5" Westbay PVC	0				60.0		300.0
DM 124	(A-1-4)6ddd 55-514881	1169.31	1168.19	Top of casing	7/23/86	15.0 - 50.0	Conventional mud rotary	0-3.5' 8" Steel 0-40' Schedule 40 5" PVC	0					39.0	50.0
DM 201	(A-1-4)5bcd 55-511601	1197.55	1197.12	Top of casing	8/2/85	17.5 - 109.0	Conventional mud rotary	0-17.5' 10.5" Steel 0-102' 6" Steel	0					47.0	109.0
DM 201OB1	(A-1-4)5bcd 55-511598	1198.69	1198.18	Top of casing	8/2/85	15.0 - 120.0	Conventional mud rotary	0-118.25' CLS.2100 2" PVC	0					47.0	120.0
DM 201OB2	(A-1-4)5bcd 55-511599	1197.62	1197.14	Top of casing	8/3/85	16.0 - 100.0	Conventional mud rotary	0-99' CLS.200 2" PVC	0					47.0	100.0
DM 201OB3	(A-1-4)5bcd 55-511600	1197.03	1196.63	Top of casing	8/3/85	14.0 - 100.0	Conventional mud rotary	0-100' CLS.200 2" PVC	0					47.0	100.0
DM 503	(A-1-4)6 bdb 55-529809	1161.23	1162.29	Top of steel casing	1/2/91	28 - 92.5	0-92.5' Conventional mud rotary	0-22' 5.5" Steel 22-87.5' 5.5" PVC	0				63		92.5
DM 701	(A-1-4)5 cbc 55-533425	1177.72	1176.97	Top of steel casing	11/01/91	25-85	0-10' auger 10-85' Conventional mud rotary	0-10' 10.75" steel 0-20' 4" steel 20-80' 4" Schedule 80 PVC	0					65	85

Table SW2.1 (Continued)

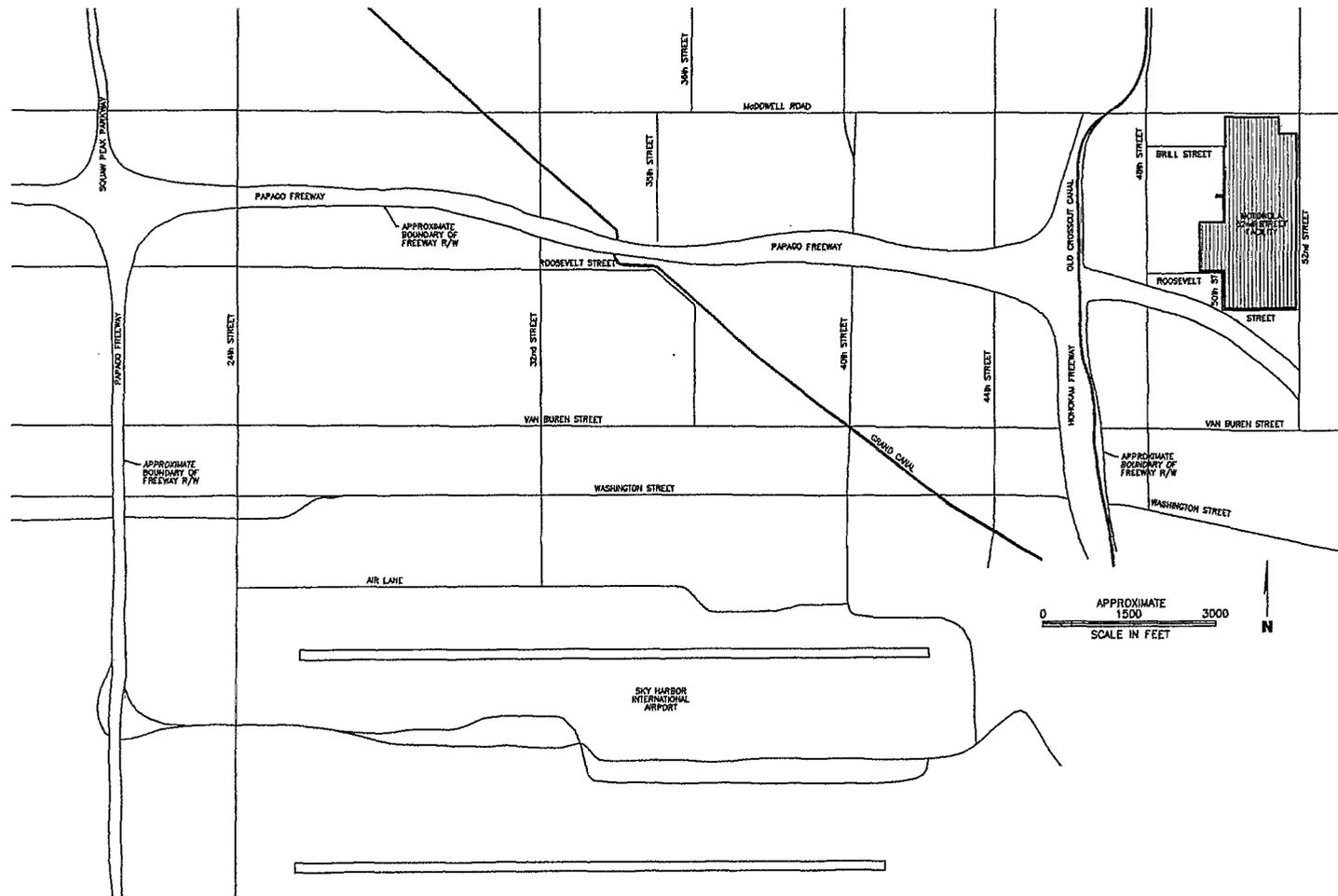
Well/Boring	ADWR File/Reg. Numbers	Elevations		Measurement Point	Completion Date	Completion Interval(s) (ft)	Drilling Method	Casing Description	Depth to Formation Top (ft)**						Total Depth Drilled (ft)
		Land Surface (ft)	Measure. Point (ft)						Cal	Tv	Ttb	Tcf	Pcg	Pcmr	
MP 16A MP 16B MP 16C MP 16D	(A-1-4)5bda	1196.20	1196.20	Top of vault	4/5/83	24.0 - 42.0 46.0 - 52.0 66.0 - 140.0 155.0 - 170.0	Hollow stem auger 0-51' NQ diamond core 51'-170'	0-42' 2" Steel (A) 0-55' 2" Steel (B) 0-139' 2" Steel (C) 0-170' 2" Steel (D)	0.0 .				50.0 .		170.0
MP 20A MP 20B MP 20C MP 20D	(A-1-4)5daa	1210.90	1210.90	Top of vault	3/31/83	18.0 - 50.0 60.0 - 86.0 96.0 - 161.0 245.0 - 255.0	Hollow stem auger 0-26' NX diamond core 26-260'	0-20' 10" Steel 0-61' 2" Steel (A) 0-81' 2" Steel (B) 0-161' 2" Steel (C) 0-251' 2" Steel (D)	0.0 .				52.0 .		260.0
MP 52A MP 52B MP 52C MP 52D	(A-1-4)6dab 55-506479	1172.10	1172.10	Top of vault	11/1/83	48.0 - 58.0 66.0 - 86.0 235.0 - 264.0 330.0 - 355.0	Mud rotary 0-355'	0-21' 10" Steel 0-50' 2" Steel (A) 0-105' 2" Steel (B) 0-265' 2" Steel (C) 0-345' 2" Steel (D)	0.0 .				93.0 .		355.0
MP 53A MP 53B MP 53C MP 53D	(A-1-4)6daa 55-506524 (A,C,D) 55-506516(B)	1181.50	1181.50	Top of vault	11/4/83 (A,C,D) 11/10/83 (B)	22.0 - 42.0 35.0 - 55.0 84.0 - 134.0 238.0 - 260.0	Mud rotary 0-260'	0-22' 10" Steel 0-35' 2" Steel (A) 0-50' 2" Steel (B) 0-145' 2" Steel (C) 0-250' 2" Steel (D)	0.0 .				55.0 .		55.0 (B) 260.0 A,C,D
48&VB (Langmade)	(A-1-4)5ccc 55-640383	1172.40	1173.25	Top of casing	N/A	6.5 - 68.6	N/A	0-11' 6" Steel 0-69' 3" PVC	0.0					11.0	75.0
18DA		1199		Ground surface	11/12/85		0.27.5' Hollow stem auger	grouted boring	0				25		27.5
18DB		1199		Ground surface	11/13/85		0-20' Hollow stem auger	grouted boring	0						20
18DC		1199		Ground surface	11/13/85		0-20' Hollow stem auger	grouted boring	0						20
18DD		1199		Ground surface	12/2/85		0-17.6' Hollow stem auger	grouted boring	0				15		17.6
SV 1DA		1199		Ground surface	12/3/85		0-23.5' Hollow stem auger	grouted boring	0						23.5
SV 2DB		1199		Ground surface	11/27/85		0-20.5' Hollow stem auger	grouted boring	0				16.5		20.5

Table SW2.1 (Continued)

Well/Boring	ADWR File/Reg. Numbers	Elevations		Measurement Point	Completion Date	Completion Interval(s) (ft)	Drilling Method	Casing Description	Depth to Formation Top (ft) ^(a)						Total Depth Drilled (ft)
		Land Surface (ft)	Measure. Point (ft)						Qal.	Tv	Ttb	Tcf	Pcg	Pcmr	
SV 2DC		1199		Ground surface	12/2/85		0-18.3' Hollow stem auger	grouted boring	0					16.0	18.3
138 SB-1		1199		Ground surface	5/8/91		0-15' Hollow stem auger	grouted boring	0						15
138 SB-2		1199		Ground surface	5/8/91		0-15.5' Hollow stem auger	grouted boring	0						15.5
138 SB-3		1199		Ground surface	5/8/91		0-15' Hollow stem auger	grouted boring	0						15
138 SB-4		1199		Ground surface	5/8/91		0-15' Hollow stem auger	grouted boring	0						15
138 SB-5		1199		Ground surface	5/8/91		0-15' Hollow stem auger	grouted boring	0						15
138 SB-6		1199		Ground surface	5/8/91		0-15' Hollow stem auger	grouted boring	0						15
138 SB-7		1199		Ground surface	5/8/91		0-10' Hollow stem auger	grouted boring	0						10

(a) Qal = Quaternary alluvium; Tv = Tertiary volcanics; Ttb = Tertiary Tempe Beds; Tcf = Tertiary Camels Head Formation; Pcg = Precambrian granite; Pcmr = Precambrian metarhyolite

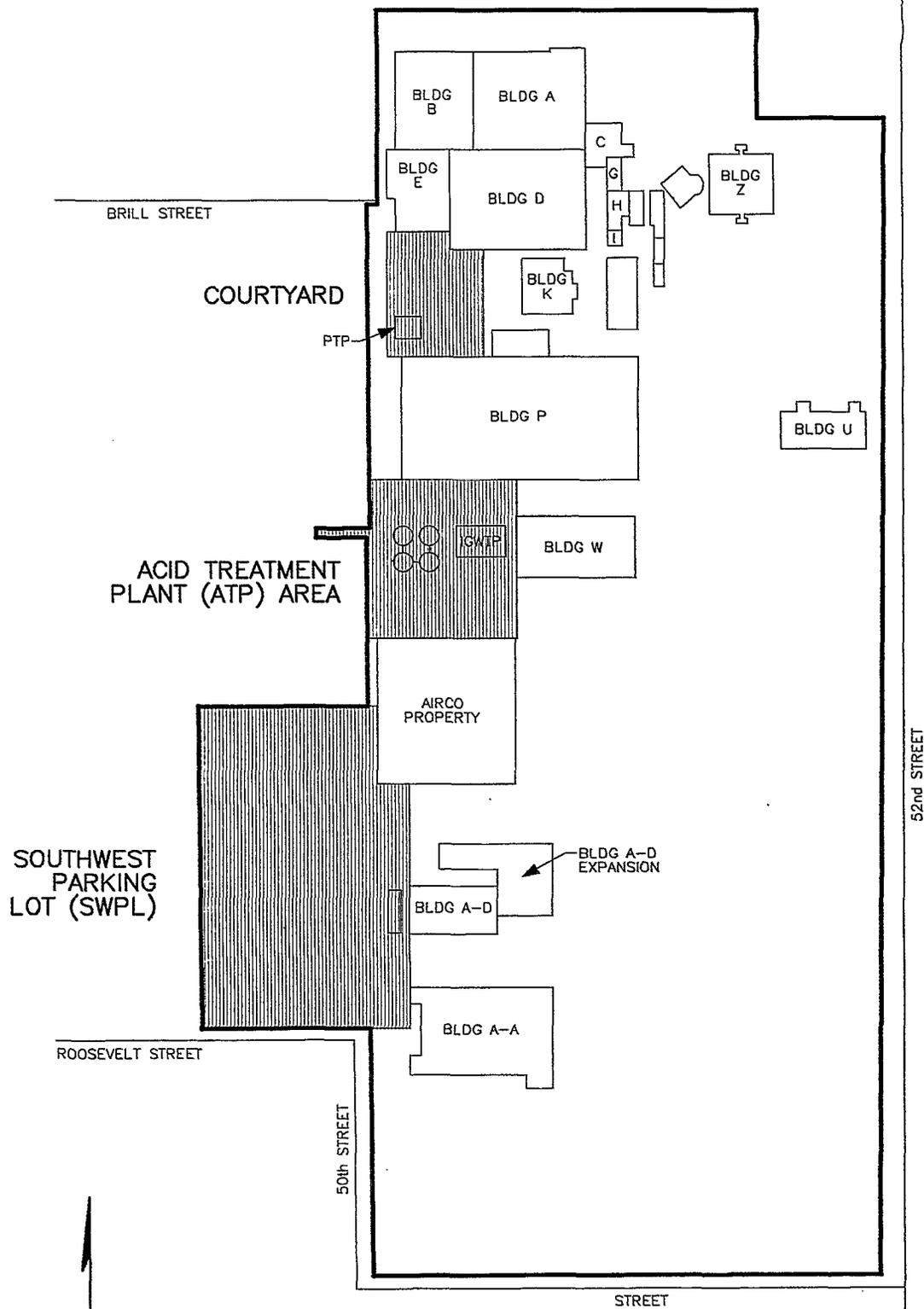
FIGURES



VICINITY MAP

Figure SW1.1

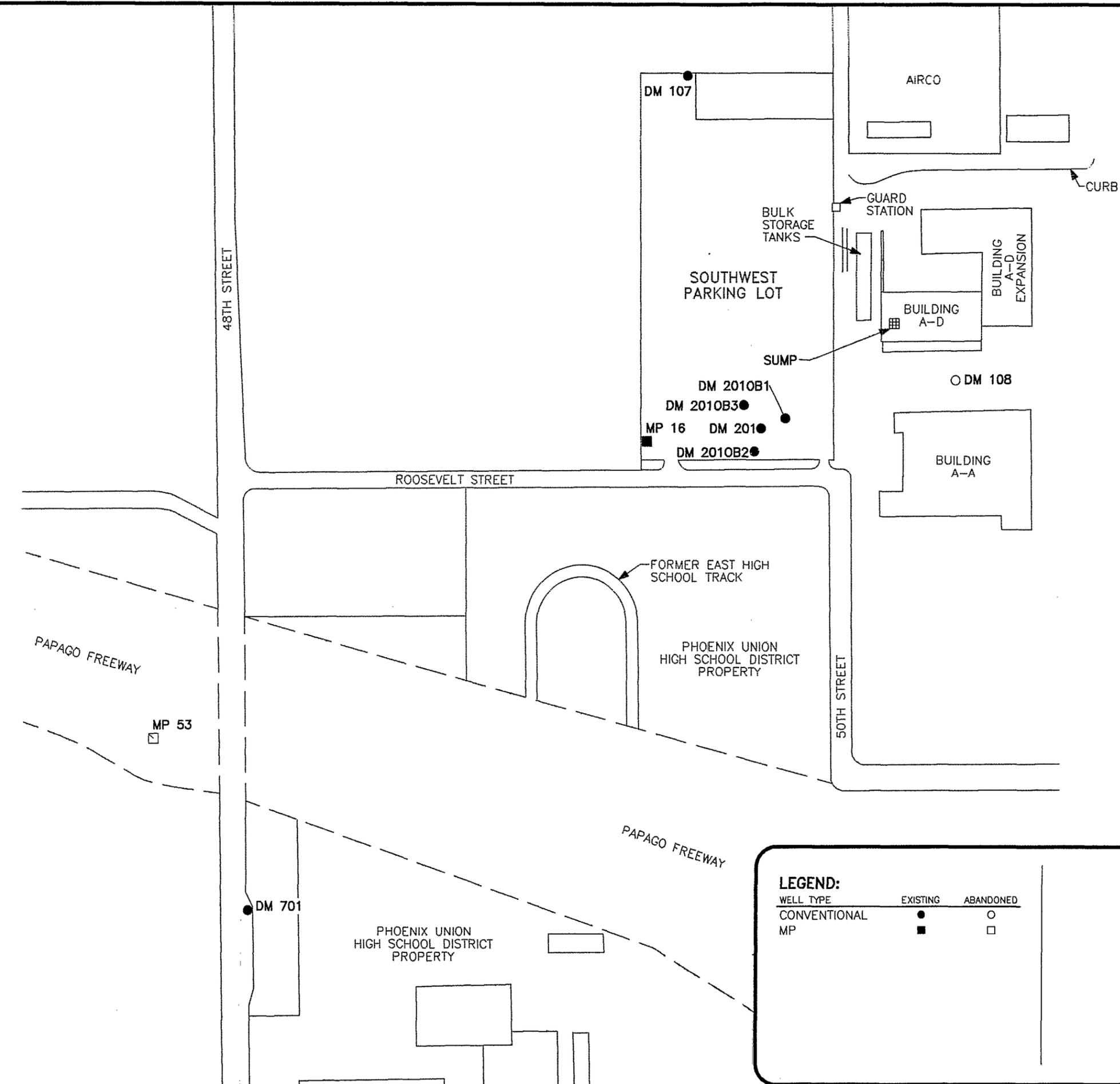
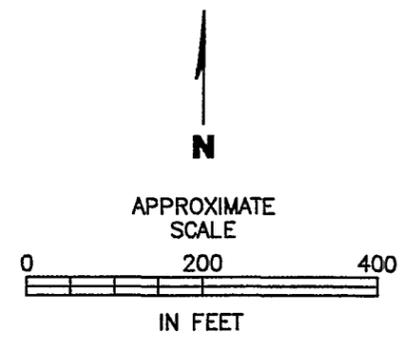
MOTOROLA 52nd ST.
FR RI
FEBRUARY 1992



**FACILITY PLAN
MOTOROLA
52nd STREET PLANT**

Figure SW1.2

MOTOROLA 52nd ST.
FR RI
FEBRUARY 1992



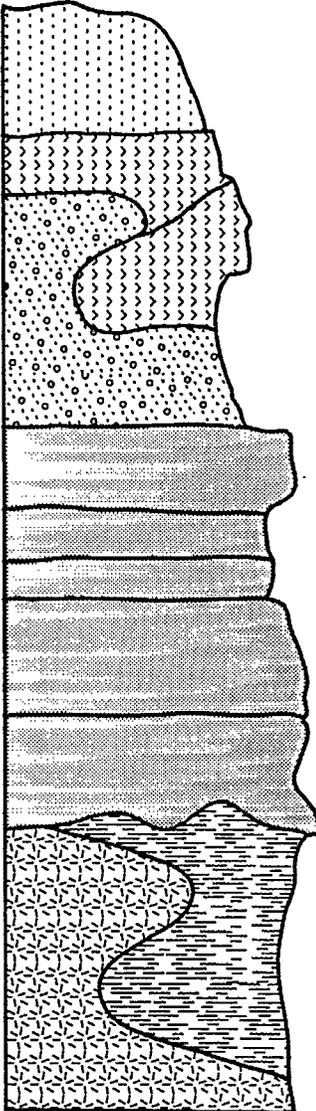
LEGEND:

WELL TYPE	EXISTING	ABANDONED
CONVENTIONAL	●	○
MP	■	□

SOUTHWEST PARKING LOT STUDY AREA

Figure SW1.3
MOTOROLA 52nd ST.
FR RI
FEBRUARY 1992

OUTCROP SCHEMATIC



FORMATION OR UNIT

GEOLOGIC PERIOD

APPROXIMATE AGE (10⁶ YR)

APPROXIMATE THICKNESS (FT)

ALLUVIUM (Qal)	QUATERNARY	0 TO 3	20 TO 240
VOLCANICS (Tv)	TERTIARY	17 TO 20	0 TO 137
TEMPE BEDS (Ttb)			0 TO 205
CAMELS HEAD FORMATION (Tcf)			0 TO 190
META-RHYOLITE (Pcmr)	PRECAMBRIAN	1,600 TO 1,800	0 TO 437
GRANITE (Pcg)			0 TO 341

NOTE:

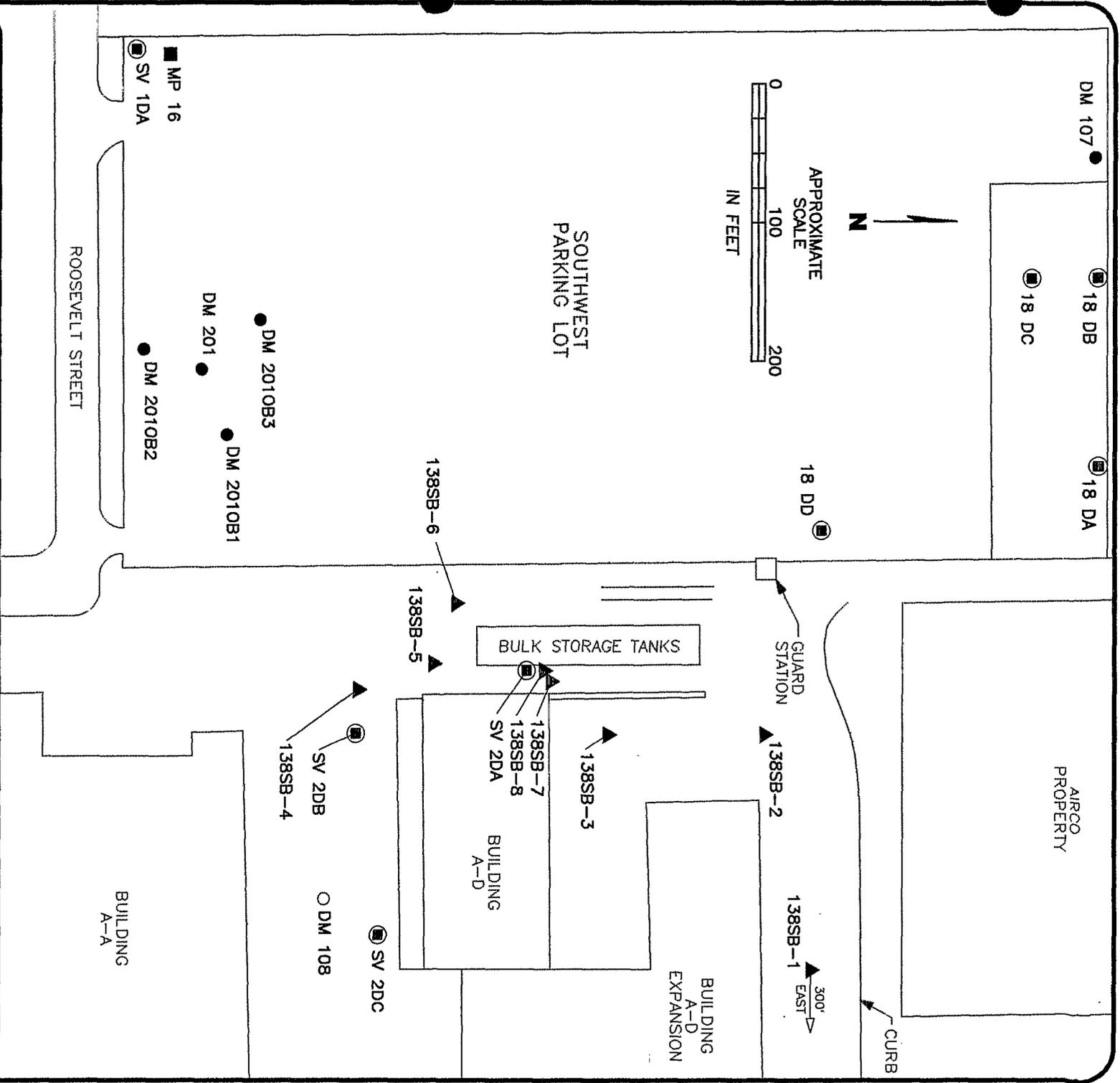
1. THICKNESSES BASED ON THICKNESSES IN BORINGS IN THE STUDY AREA. GREATER THICKNESSES OF ALL BEDROCK UNITS OCCUR IN OUTCROP.
2. OUTCROP SCHEMATIC IS A COMPOSITE FROM PAPAGO BUTTES, TEMPE BUTTE, TWIN BUTTE AND CAMELBACK MOUNTAIN.
3. NOT TO SCALE

REFERENCE: Figure 3.5,
DRAFT RI REPORT, 1987
M1 52nd STREET

STRATIGRAPHIC COLUMN

Figure SW2.1

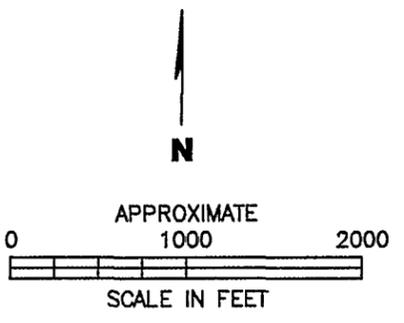
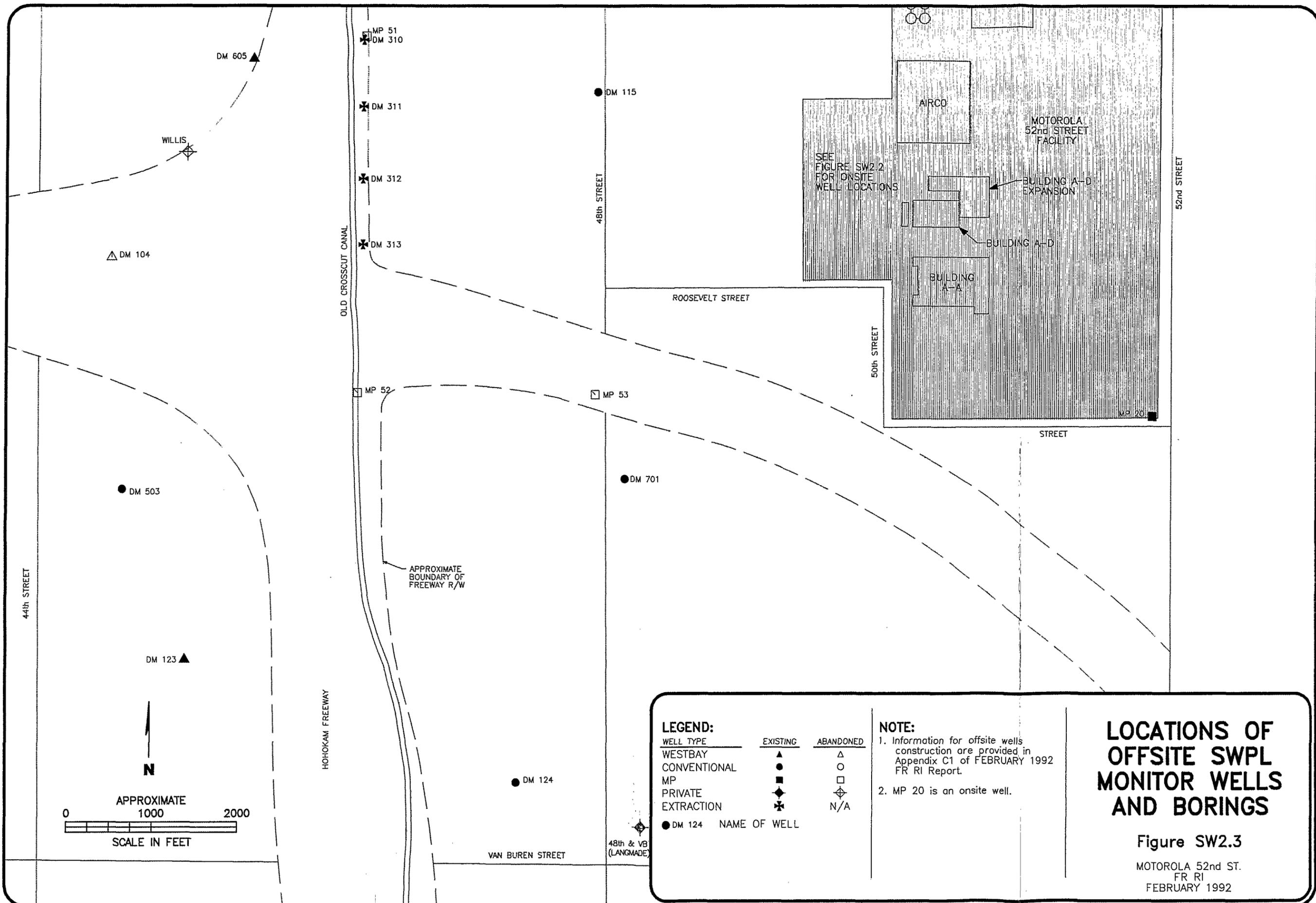
MOTOROLA 52nd ST.
FR RI
FEBRUARY 1992



LOCATIONS OF ONSITE SWPL MONITOR WELLS AND BORINGS

Figure SW2.2

MOTOROLA 52nd ST.
FR RI
FEBRUARY 1992



LEGEND:

WELL TYPE	EXISTING	ABANDONED
WESTBAY	▲	△
CONVENTIONAL	●	○
MP	■	□
PRIVATE EXTRACTION	◆	◇
	✱	N/A

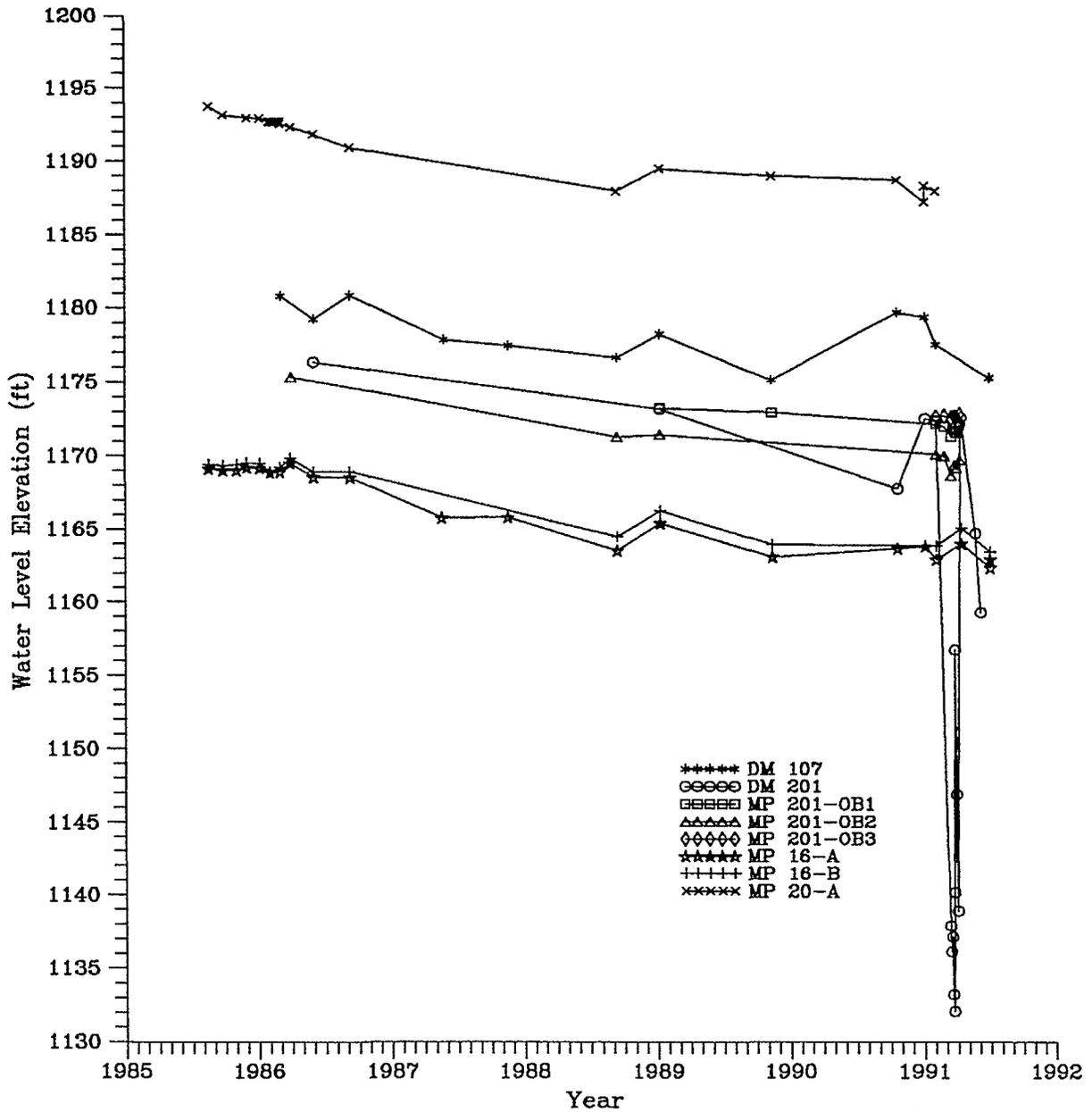
● DM 124 NAME OF WELL

NOTE:

- Information for offsite wells construction are provided in Appendix C1 of FEBRUARY 1992 FR RI Report.
- MP 20 is an onsite well.

LOCATIONS OF OFFSITE SWPL MONITOR WELLS AND BORINGS

Figure SW2.3
MOTOROLA 52nd ST.
FR RI
FEBRUARY 1992



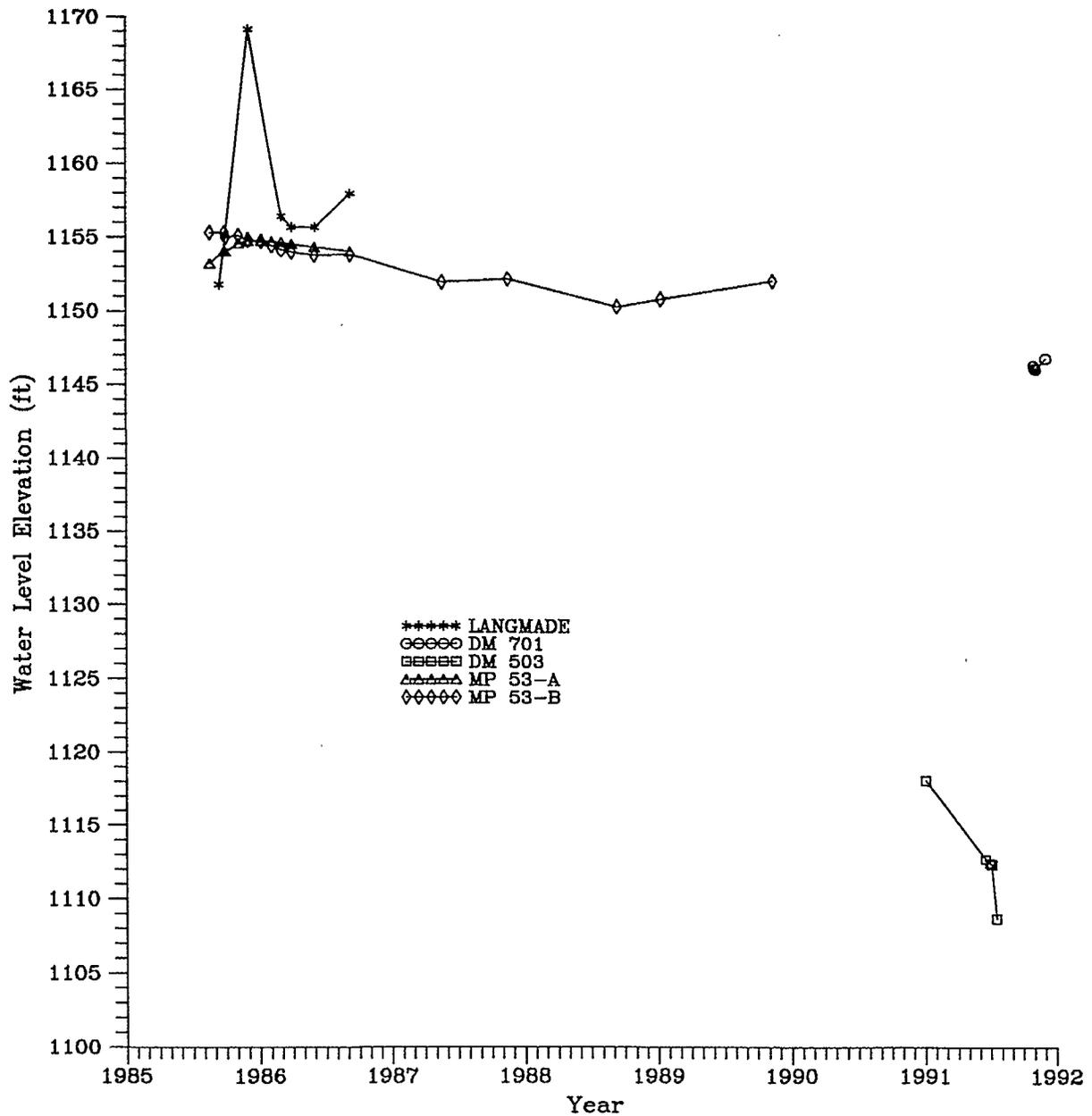
NOTE:

Variation in water level elevation in DM 201 beginning MARCH 1991 is due to pumping of DM 201 as discussed in CHAPTER SW5.

**WATER LEVEL ELEVATIONS
IN ONSITE SWPL WELLS
1985-1991**

Figure SW2.4A

MOTOROLA 52nd ST.
FR RI
FEBRUARY 1992



**WATER LEVEL ELEVATIONS
 IN OFFSITE SWPL WELLS
 1985-1991**

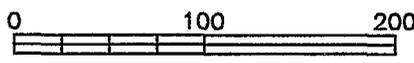
Figure SW2.4B
 MOTOROLA 52nd ST.
 FR RI
 FEBRUARY 1992

DM 107
1177.48

AIRCO
PROPERTY



APPROXIMATE
SCALE



IN FEET

CURB

GUARD
STATION

BUILDING
A-D
EXPANSION

SOUTHWEST
PARKING LOT

BULK STORAGE
TANKS

BUILDING
A-D

O DM 108

DM 201OB3
1172.60

DM 201OB1
1172.11

DM 201
1172.33

DM 201OB2
1170.04

BUILDING
A-A

MP 16
■ 1162.91

1175

1170

1165



LEGEND:

MONITOR WELL TYPE	EXISTING	ABANDONED
CONVENTIONAL	●	○
MP	■	□

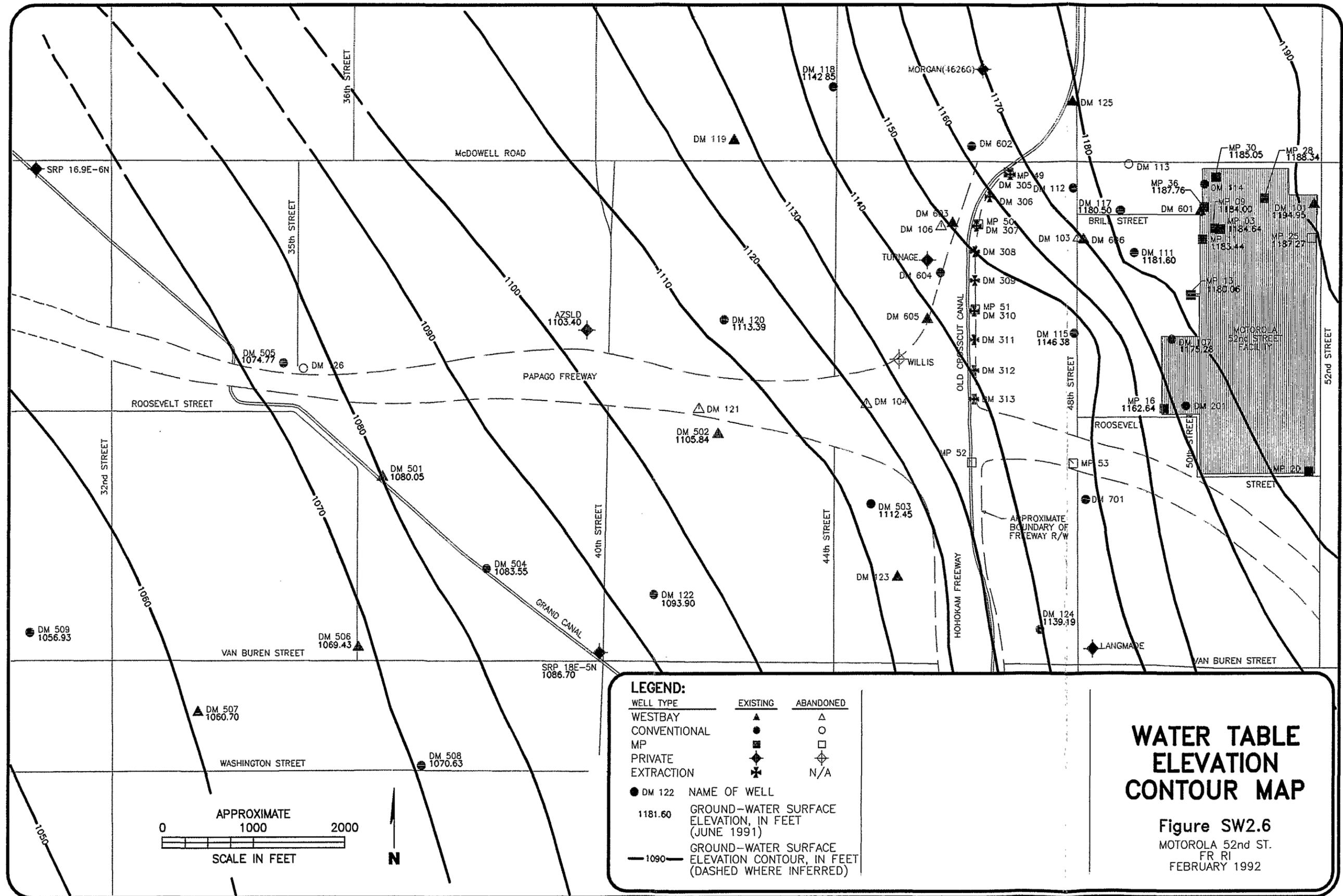
1170 — GROUND-WATER
ELEVATION CONTOUR

 DIRECTION OF
GROUND-WATER FLOW

SWPL WATER LEVEL ELEVATIONS

2/6/91 Figure SW2.5

MOTOROLA 52nd ST.
FR RI
FEBRUARY 1992



LEGEND:

WELL TYPE	EXISTING	ABANDONED
WESTBAY	▲	△
CONVENTIONAL	●	○
MP	■	□
PRIVATE	◆	◇
EXTRACTION	✱	N/A

● DM 122 NAME OF WELL
1181.60 GROUND-WATER SURFACE ELEVATION, IN FEET (JUNE 1991)
-1090- GROUND-WATER SURFACE ELEVATION CONTOUR, IN FEET (DASHED WHERE INFERRED)

WATER TABLE ELEVATION CONTOUR MAP

Figure SW2.6
MOTOROLA 52nd ST.
FR RI
FEBRUARY 1992

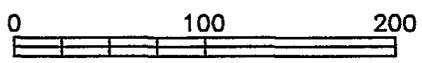
DM 107

AIRCO
PROPERTY



SOURCE 18

APPROXIMATE
SCALE



IN FEET

CURB

GUARD
STATION

BUILDING
A-D
EXPANSION

SOUTHWEST
PARKING LOT

BULK STORAGE TANKS

BUILDING
A-D

SOURCE SV2

○ DM 108

● DM 2010B3

● DM 2010B1

SOURCE SV1

● DM 201

■ MP 16

● DM 2010B2

BUILDING
A-A

ROOSEVELT STREET

LEGEND:

WELL TYPE	EXISTING	ABANDONED
CONVENTIONAL	●	○
MP	■	□

**LOCATIONS OF
POTENTIAL SOURCES
IDENTIFIED IN 1987
DRAFT RI REPORT**

Figure SW3.1

MOTOROLA 52nd ST.
FR RI
FEBRUARY 1992

DM 107

138-22 *

138-23 *

158-36 +

AIRCO PROPERTY

N

APPROXIMATE SCALE



158-34 +

158-33 +

+ 158-32

* 138-20

+ 158-31

CURB

+ 158-35
GUARD STATION

138-13 *

158-26 +

+ 158-22

BUILDING A-D EXPANSION

SOUTHWEST PARKING LOT

158-27

158-28

158-74

158-29

158-29A

138-8 *

158-18

138-6 *

138-5

BULK STORAGE TANKS

* 138-12

+ 158-23 + 158-24 +

158-25 +

BUILDING A-D

158-19
158-19A

158-75 +

158-20 +

+ 158-21

* 138-21

138-9 *

158-52

+ 158-30

* O DM 108

138-11

138-10 *

158-53

138-2

DM 2010B3

138-1 *

138-3

138-4 *

DM 201

DM 2010B1

MP 16

138-16 *

DM 2010B2

138-15 *

138-14 *

138-17 *

138-18

BUILDING A-A

158-54

158-13 + 158-12 + 158-11 + 158-10 +

ROOSEVELT ST.

LEGEND:

SOIL GAS SAMPLE LOCATIONS

MARCH 1991

*

NOVEMBER 1991

+

WELL TYPE

EXISTING

ABANDONED

CONVENTIONAL

●

○

MP

■

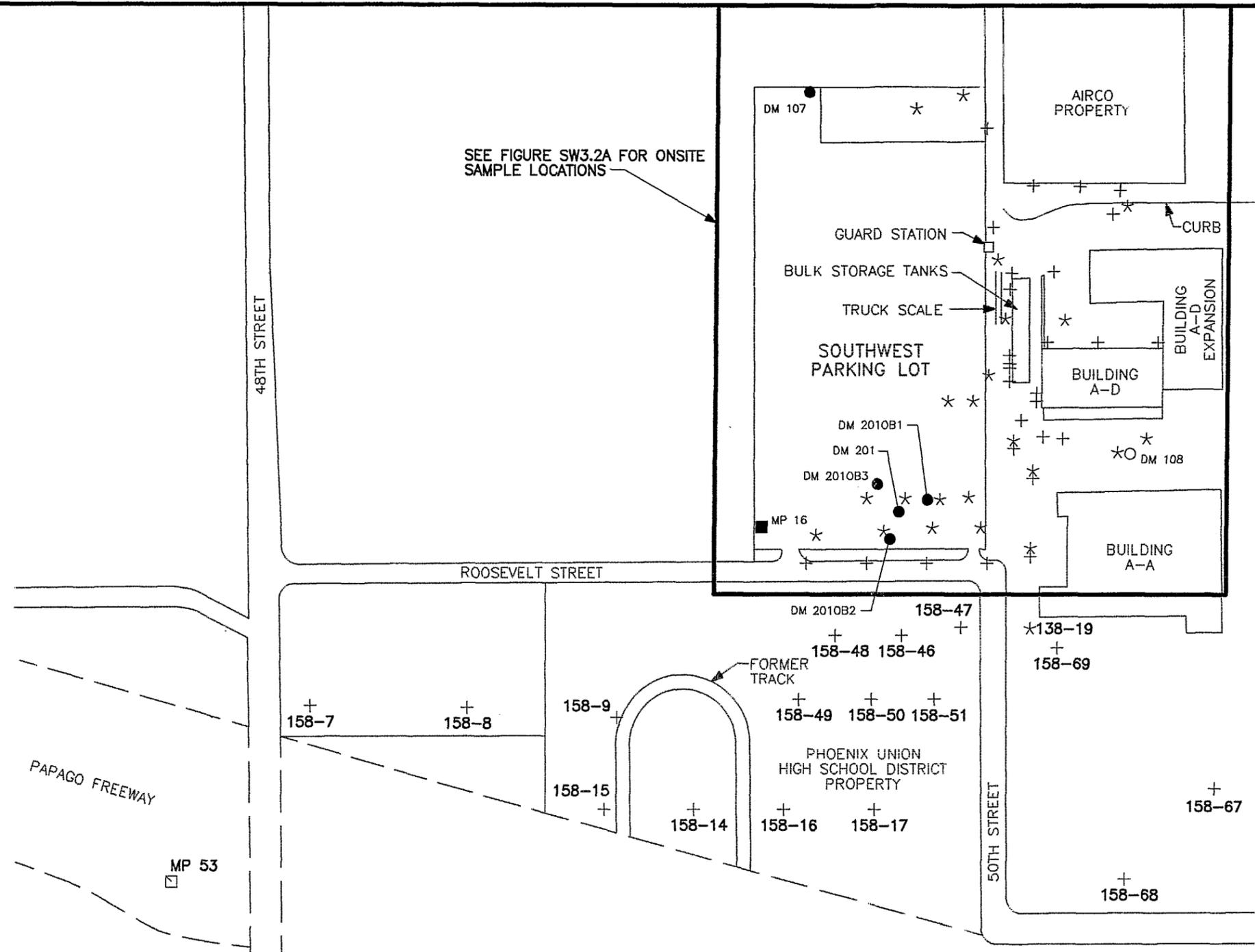
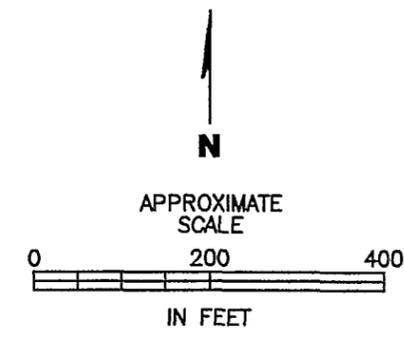
□

NOTES:

Locations 158-10 through 158-13 are shown on FIGURE SW3.2B.

1991 ONSITE SOIL GAS SAMPLE LOCATIONS
Figure SW3.2A

MOTOROLA 52nd ST.
FR RI
FEBRUARY 1992



SEE FIGURE SW3.2A FOR ONSITE SAMPLE LOCATIONS

LEGEND:

SOIL GAS SAMPLE LOCATIONS		
MARCH 1991	*	
NOVEMBER 1991	+	
WELL TYPE		
EXISTING	ABANDONED	
CONVENTIONAL	●	○
MP	■	□

NOTES:

Locations 158-19, 158-67, 158-68 and 158-69 are shown on FIGURE SW3.2A.

1991 OFFSITE SOIL GAS SAMPLE LOCATIONS

Figure SW3.2B
MOTOROLA 52nd ST.
FR R1
FEBRUARY 1992

DM 107 ●

<0.01*

<0.01*

AIRCO PROPERTY

0.2



APPROXIMATE SCALE



0.04+ 0.4 + <0.05

*1.7
+ 0.2

CURB

+ 0.3 GUARD STATION

BULK STORAGE TANKS

BUILDING A-D EXPANSION

SOUTHWEST PARKING LOT

50
670
820
1400/700
1000*

BUILDING A-D
+17000 +1800 <50+
110000/1600

190

580+

65000+
48/90
16000
+ 6100
0.5*

629* ○ DM 108

0.2/0.8
400
6

DM 2010B3 ●
0.3*

DM 201 ●
DM 2010B1 ●

DM 2010B2 ●
61*

28*
23*

■ MP 16

11*
20*
28*
28*
0.3*
7+
53+
Roosevelt Street
0.4+

<0.01*
<0.4

BUILDING A-A

LEGEND:

SOIL GAS SAMPLE LOCATIONS

MARCH 1991	*
NOVEMBER 1991	+
NOT QUANTIFIED	NQ
TCA CONCENTRATION	0.06
DUPLICATE SAMPLE	3.0/<0.1
SOIL GAS CONTOUR	-20-

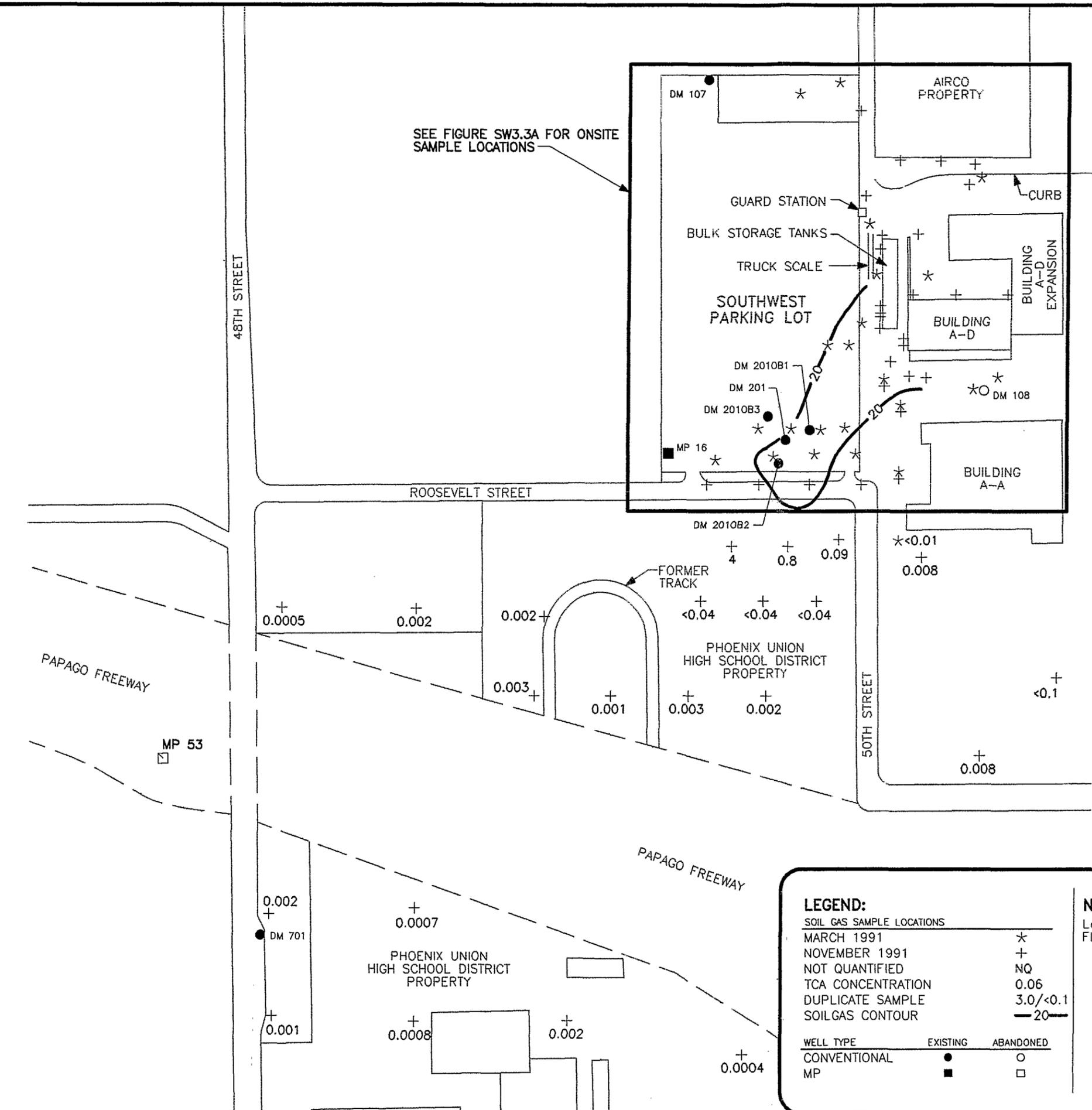
WELL TYPE	EXISTING	ABANDONED
CONVENTIONAL	●	○
MP	■	□

NOTES:

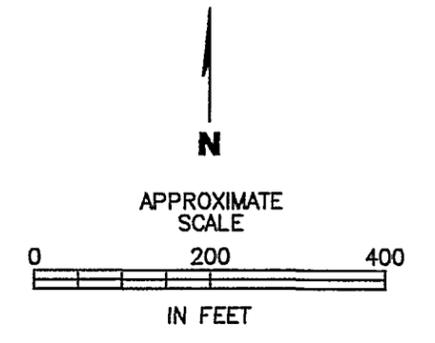
Locations South of Roosevelt Street are on FIGURE SW3.3B.

**1991
ONSITE TCA
SOILGAS
(ug/l)
Figure SW3.3A**

MOTOROLA 52nd ST.
FR RI
FEBRUARY 1992



SEE FIGURE SW3.3A FOR ONSITE SAMPLE LOCATIONS



LEGEND:

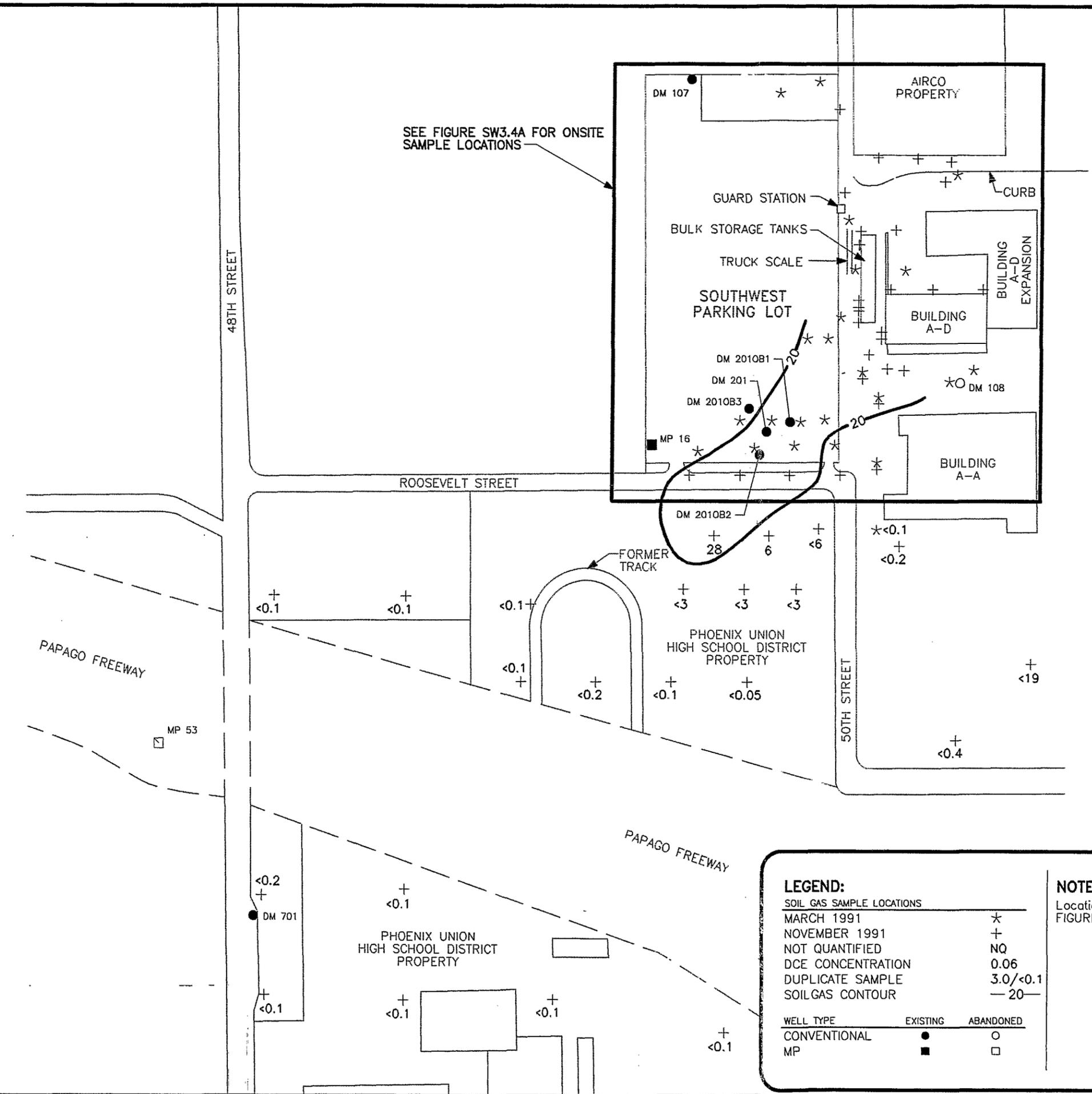
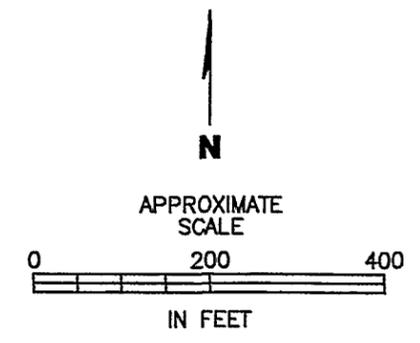
SOIL GAS SAMPLE LOCATIONS		
MARCH 1991		*
NOVEMBER 1991		+
NOT QUANTIFIED		NQ
TCA CONCENTRATION		0.06
DUPLICATE SAMPLE		3.0/<math><0.1</math>
SOILGAS CONTOUR		-20-
WELL TYPE		
	EXISTING	ABANDONED
CONVENTIONAL	●	○
MP	■	□

NOTES:

Locations South of building A-A are on FIGURE SW3.3A.

**1991
OFFSITE TCA
SOILGAS
(ug/l)**

Figure SW3.3B
MOTOROLA 52nd ST.
FR RI
FEBRUARY 1992



LEGEND:

SOIL GAS SAMPLE LOCATIONS	
MARCH 1991	*
NOVEMBER 1991	+
NOT QUANTIFIED	NQ
DCE CONCENTRATION	0.06
DUPLICATE SAMPLE	3.0/<0.1
SOIL GAS CONTOUR	-20-
WELL TYPE	
CONVENTIONAL	● (EXISTING) ○ (ABANDONED)
MP	■ (EXISTING) □ (ABANDONED)

NOTES:
Locations South of building A-A are on FIGURE SW3.4A.

1991 OFFSITE DCE SOILGAS (ug/l)

Figure SW3.4B
MOTOROLA 52nd ST.
FR RI
FEBRUARY 1992

DM 107

0.20*

<0.01*

AIRCO PROPERTY

0.3

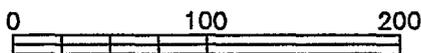
0.8+

0.1+

+ <0.04

N

APPROXIMATE SCALE



IN FEET

*0.3
+ 0.4

CURB

+ 0.5 GUARD STATION

<0.01

16

28

BUILDING A-D EXPANSION

SOUTHWEST PARKING LOT

790

190

74

200/74

NQ*

2+

56+

53/<37

BUILDING A-D

+65

+350

170+

NQ+

113/48

7600

+ <1

101* O DM 108

*7

9.4*

*619

20

31/45

*0.4

DM 2010B3

99*

176*

62*

DM 2010B1

*158

DM 201

76*

DM 2010B2

23*

5.4*

11/14

*3

BUILDING A-A

MP 16

4

9

12

2

ROOSEVELT STREET

LEGEND:

SOIL GAS SAMPLE LOCATIONS

MARCH 1991	*
NOVEMBER 1991	+
NOT QUANTIFIED	NQ
PCE CONCENTRATION	0.06
DUPLICATE SAMPLE	3.0/<0.1
SOILGAS CONTOUR	-20-

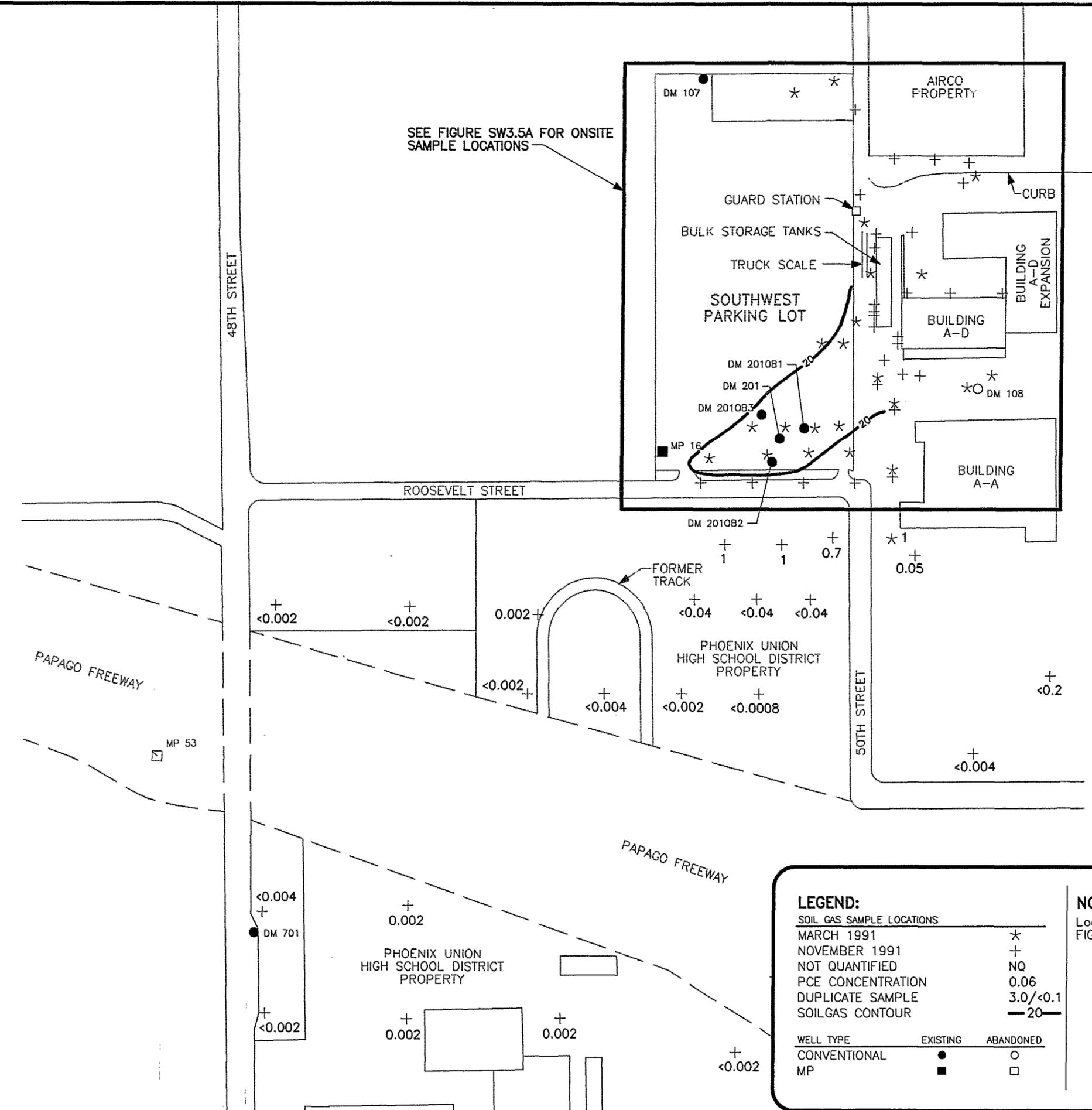
WELL TYPE	EXISTING	ABANDONED
CONVENTIONAL	●	○
MP	■	□

NOTES:

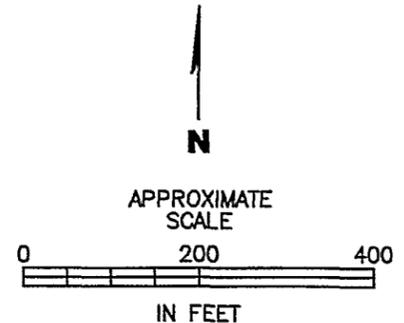
Locations on Roosevelt Street are on FIGURE SW3.5B.

1991
ONSITE PCE
SOILGAS
(ug/l)
Figure SW3.5A

MOTOROLA 52nd ST.
FR RI
FEBRUARY 1992



SEE FIGURE SW3.5A FOR ONSITE SAMPLE LOCATIONS



LEGEND:

SOIL GAS SAMPLE LOCATIONS	
MARCH 1991	*
NOVEMBER 1991	+
NOT QUANTIFIED	NQ
PCE CONCENTRATION	0.06
DUPLICATE SAMPLE	3.0/<math><0.1</math>
SOILGAS CONTOUR	—20—

WELL TYPE	EXISTING	ABANDONED
CONVENTIONAL	●	○
MP	■	□

NOTES:
Locations South of building A-A are on FIGURE SW3.5A.

**1991
OFFSITE PCE
SOILGAS
(ug/l)**

Figure SW3.5B
MOTOROLA 52nd ST.
FR RI
FEBRUARY 1992

DM 107

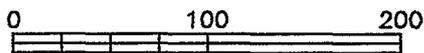
3.18*

6.74*

AIRCO PROPERTY

N

APPROXIMATE SCALE



IN FEET

SOUTHWEST PARKING LOT

<0.01+ <0.02+ + <0.1

* <0.01
+ 0.1

CURB

+ <0.6
GUARD STATION

<0.01

BULK STORAGE TANKS

BUILDING A-D EXPANSION

* 0.72

+ <2 + NQ NQ +

BUILDING A-D

NQ/NQ

2.9*

NQ/NQ

<2

0.31*

NQ +

NQ +

<1.00

+ <1

* <0.01

NQ* O DM 108

6.03/5.58

* <1

DM 2010B3

0.15*

0.27*

0.32*

* 0.03

DM 201

DM 2010B1

■ MP 16

0.95*

* 1.63

* <0.01

* <0.01

DM 2010B2

<0.01/0.16

* <1

BUILDING A-A

+ <2

Roosevelt Street

+ <2

+ <0.2

LEGEND:

SOIL GAS SAMPLE LOCATIONS

MARCH 1991	*
NOVEMBER 1991	+
NOT QUANTIFIED	NQ
TCE CONCENTRATION	0.06
DUPLICATE SAMPLE	3.0/<0.1

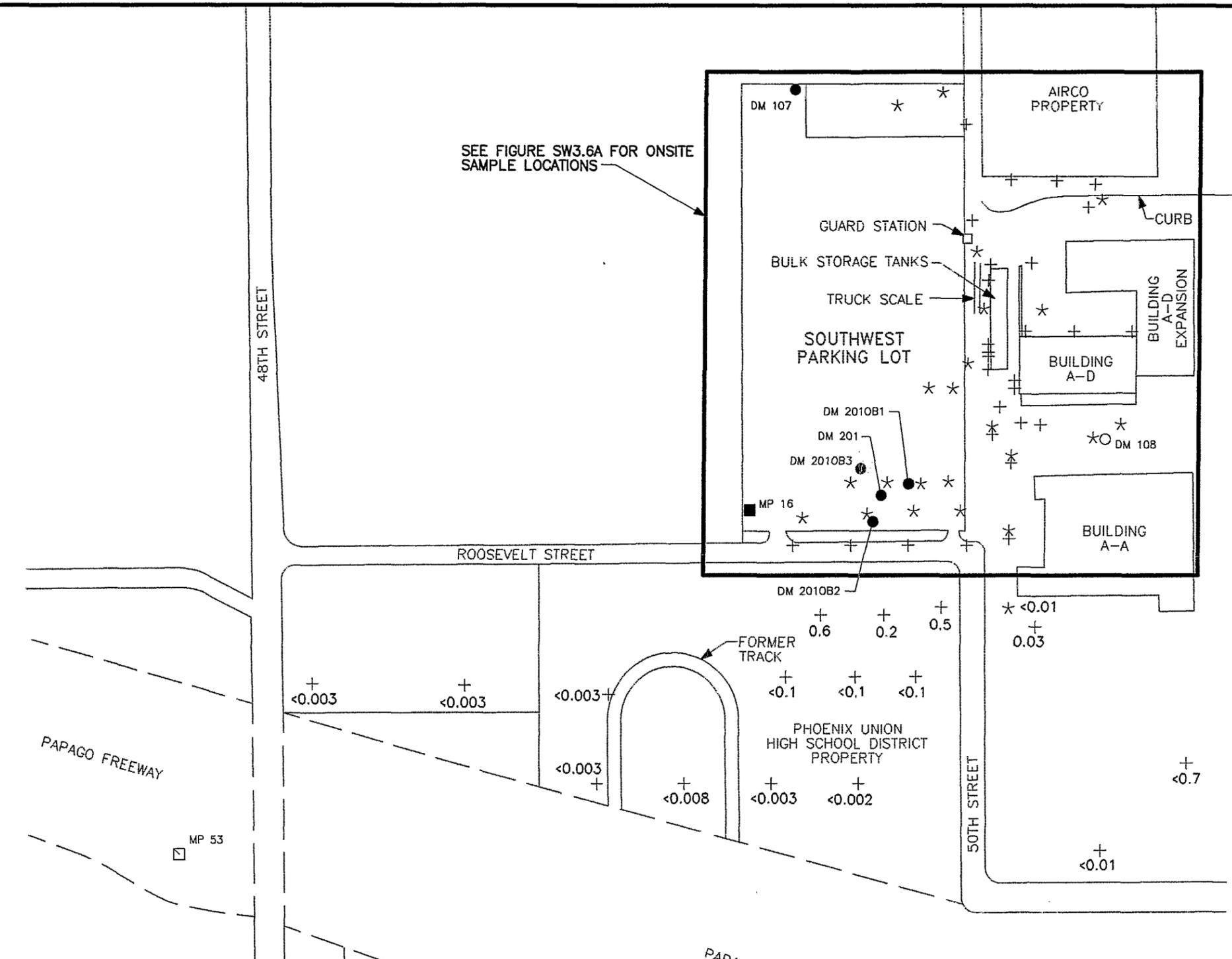
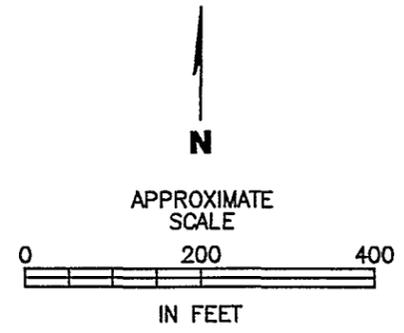
WELL TYPE	EXISTING	ABANDONED
CONVENTIONAL	●	○
MP	■	□

NOTES:

Locations on Roosevelt Street are on FIGURE SW3.6B.

1991
ONSITE TCE
SOILGAS
(ug/l)
Figure SW3.6A

MOTOROLA 52nd ST.
FR RI
FEBRUARY 1992



LEGEND:

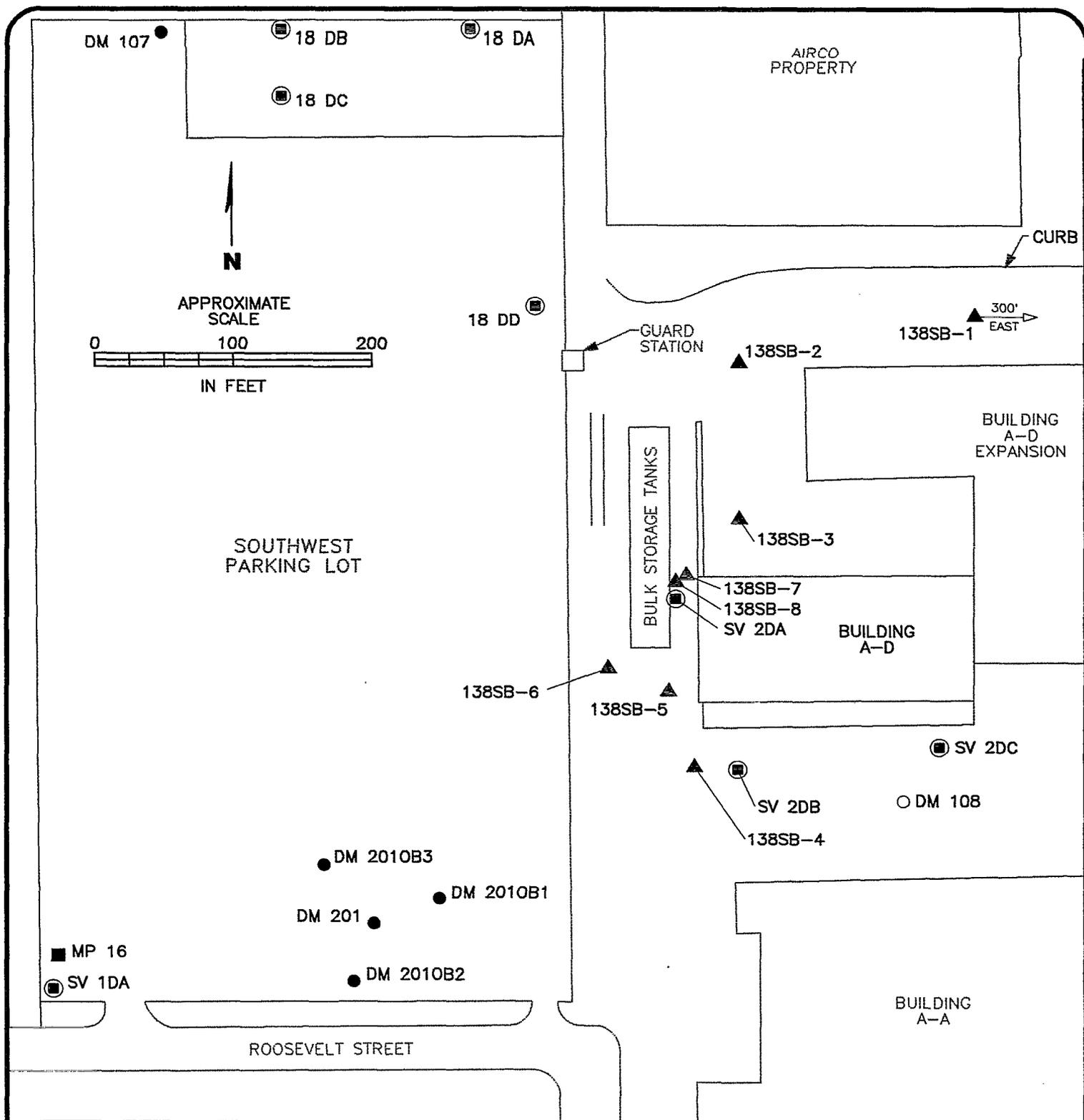
SOIL GAS SAMPLE LOCATIONS	
MARCH 1991	*
NOVEMBER 1991	+
NOT QUANTIFIED	NQ
TCE CONCENTRATION	0.06
DUPLICATE SAMPLE	3.0/<0.1

WELL TYPE	EXISTING	ABANDONED
CONVENTIONAL	●	○
MP	■	□

NOTES:
Locations South of building A-A are on FIGURE SW3.6A.

1991 OFFSITE TCE SOILGAS (ug/l)

Figure SW3.6B
MOTOROLA 52nd ST.
FR R1
FEBRUARY 1992



LEGEND:

MONITOR WELL TYPE	EXISTING	ABANDONED
CONVENTIONAL	●	○
MP	■	□

BORING	
MAY 1991	▲
1985	◐

1991 SOIL BORING LOCATIONS

Figure SW3.7

MOTOROLA 52nd ST.
FR RI
FEBRUARY 1992

DM 107

AIRCO PROPERTY

N

APPROXIMATE SCALE



CURB

GUARD STATION

138SB-2

1.5
ND
ND
ND
ND

BUILDING A-D EXPANSION

SOUTHWEST PARKING LOT

138SB-8

0.3	0.5
0.35	0.21
0.49	0.20
ND	ND
0.32	ND

BULK STORAGE TANKS

138SB-3

1.5	5.0
0.09	<0.01
0.03	<0.01
0.03	<0.01
ND	ND

BUILDING A-D

138SB-6

5.5
0.07
ND
ND
ND

1.5	10.5
0.13	0.09
ND	ND
ND	ND
ND	ND

1.5	15.5
0.07	0.04
ND	ND
ND	ND
ND	ND

DM 108

DM 2010B3

DM 2010B1

DM 201

MP 16

DM 2010B2

ROOSEVELT STREET

BUILDING A-A

LEGEND:

MONITOR WELL TYPE	EXISTING	ABANDONED
CONVENTIONAL	●	○
MP	■	□
BORING		
MAY 1991		▲

ANALYTE CONCENTRATIONS IN mg/kg

1.5	DEPTH (FT)
0.09	TCA
0.03	PCE
0.02	TCE
ND	TOTAL XYLENES
ND	NO DETECTION

MAY 1991 SOIL SAMPLE RESULTS

Figure SW3.8

MOTOROLA 52nd ST.
FR RI
FEBRUARY 1992

DM 107

AIRCO PROPERTY



APPROXIMATE SCALE



SOUTHWEST PARKING LOT

GUARD STATION

138SB-1 300' EAST

138SB-2

BUILDING A-D EXPANSION

BULK STORAGE TANKS

138SB-3

138SB-8

138SB-7

BUILDING A-D

138SB-6

138SB-5

SUMP

1.5	2.5
11700	30000
149	54
41	47
34	870

DM 108

138SB-4

DM 2010B3

DM 2010B1

DM 201

DM 2010B2

MP 16

BUILDING A-A

ROOSEVELT STREET

LEGEND:

MONITOR WELL TYPE	EXISTING	ABANDONED
CONVENTIONAL	●	○
MP	■	□

BORING

MAY 1991	▲
DECEMBER 1991	■

ANALYTE CONCENTRATIONS IN mg/kg

DEPTH (FT)	ANALYTE
1.5	TCA
0.09	PCE
0.03	TCE
0.02	TOTAL XYLENES
ND	NO DETECTION

ND NO DETECTION

NOTE: Results from borings shown on Figure SW3.8.

BUILDING A-D SUMP SAMPLE RESULTS

Figure SW3.9

MOTOROLA 52nd ST.
FR RI
FEBRUARY 1992

DM 107

7/1/91
<0.2
<0.2
0.3
50.8



APPROXIMATE SCALE



SOUTHWEST PARKING LOT

PROPERTY

CURB

GUARD STATION

BULK STORAGE TANKS

BUILDING A-D EXPANSION

DM 108

4/12/91
10
3.4
20
58

12/9/91
22000
19000
800
<100

12/9/91
1700
1900
330
20

DM 2010B3

DM 2010B1

MP 16

7/3/91
3
8.7
16.9
13.1

4/12/91
6900
4300
450
43

DM 201

DM 2010B2

BUILDING A-A

LEGEND:

MONITOR WELL TYPE	EXISTING	ABANDONED
CONVENTIONAL	●	○
MP	■	□

VOC CONCENTRATIONS IN ppb

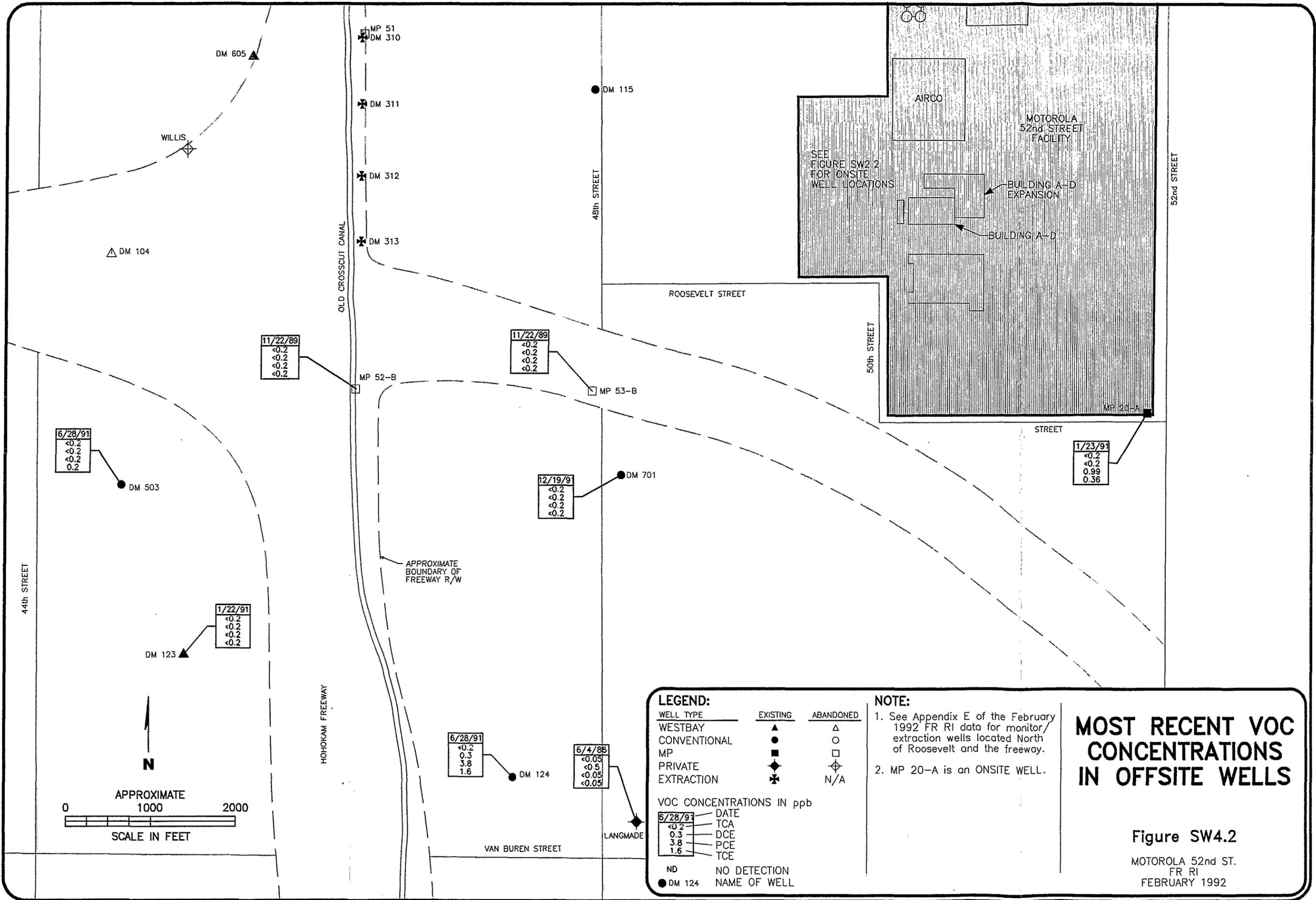
12/91/91	DATE
1700	TCA
1900	DCE
330	PCE
20	TCE

ND NO DETECTION
● DM 201 NAME OF WELL

MOST RECENT VOC CONCENTRATIONS IN ONSITE WELLS

Figure SW4.1

MOTOROLA 52nd ST.
FR RI
FEBRUARY 1992



6/28/91

<0.2
<0.2
<0.2
0.2

11/22/89

<0.2
<0.2
<0.2
<0.2

11/22/89

<0.2
<0.2
<0.2
<0.2

12/19/91

<0.2
<0.2
<0.2
<0.2

1/23/91

<0.2
<0.2
0.99
0.36

1/22/91

<0.2
<0.2
<0.2
<0.2

6/28/91

<0.2
0.3
3.8
1.6

6/4/88

<0.05
<0.5
<0.05
<0.05

LEGEND:

WELL TYPE	EXISTING	ABANDONED
WESTBAY CONVENTIONAL	▲	△
MP	●	○
PRIVATE EXTRACTION	◆	◇
	✱	N/A

VOC CONCENTRATIONS IN ppb

6/28/91	DATE
<0.2	TCA
0.3	DCE
3.8	PCE
1.6	TCE

ND NO DETECTION
 ● DM 124 NAME OF WELL

NOTE:

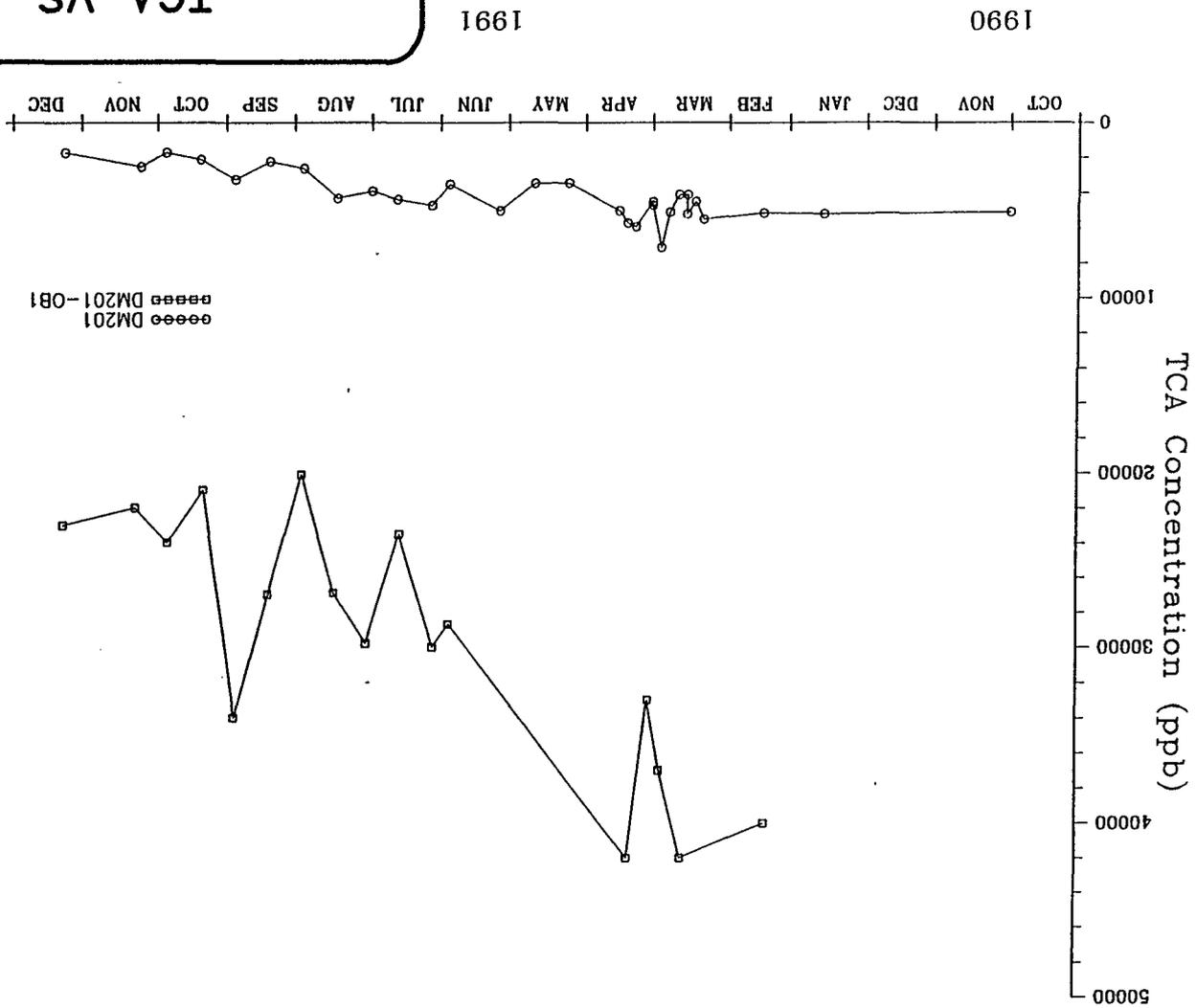
- See Appendix E of the February 1992 FR RI data for monitor/extraction wells located North of Roosevelt and the freeway.
- MP 20-A is an ONSITE WELL.

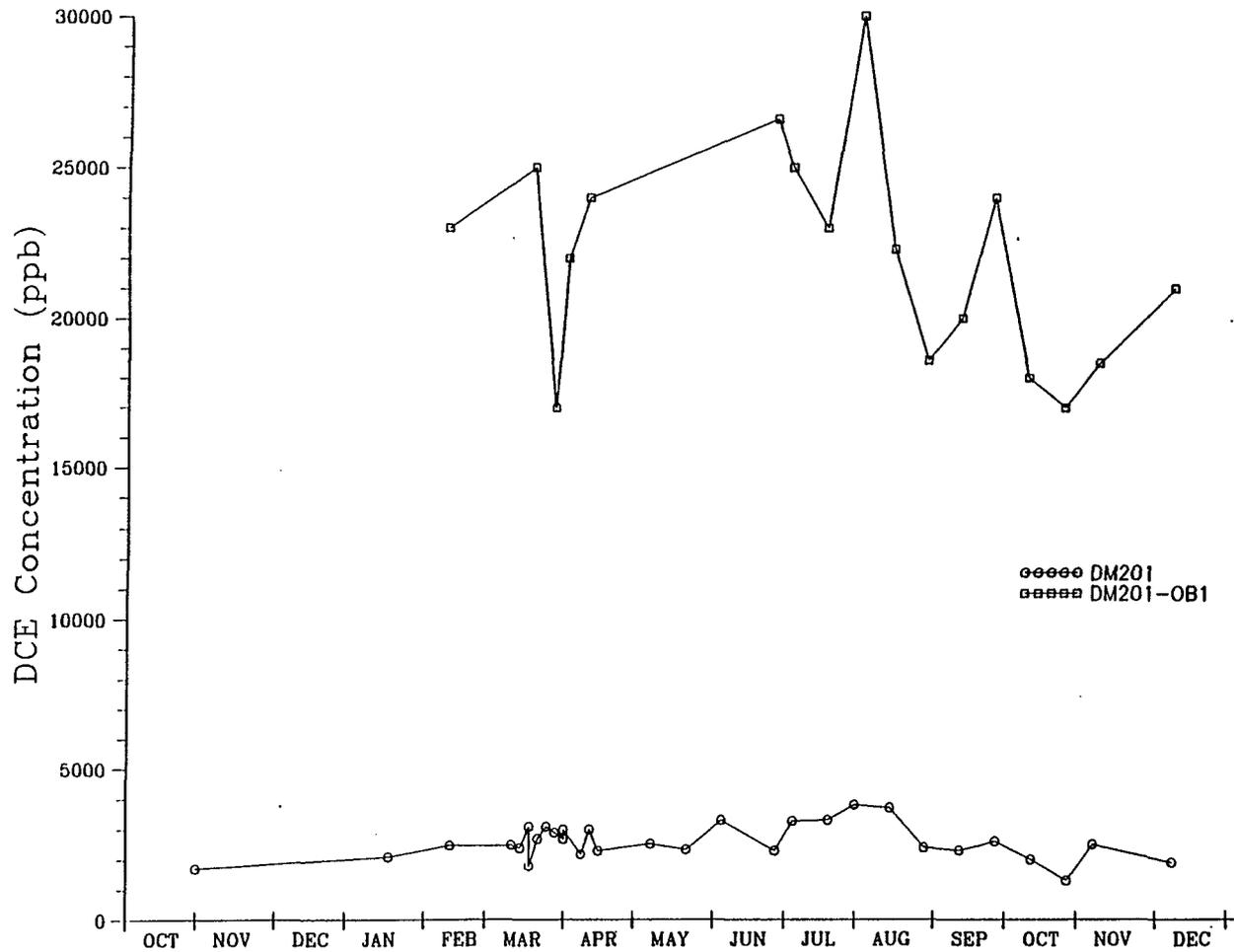
MOST RECENT VOC CONCENTRATIONS IN OFFSITE WELLS

Figure SW4.2
 MOTOROLA 52nd ST.
 FR RI
 FEBRUARY 1992

Figure SWS.1
MOTOROLA 52nd ST.
FR RI
FEBRUARY 1992

TCA VS. TIME



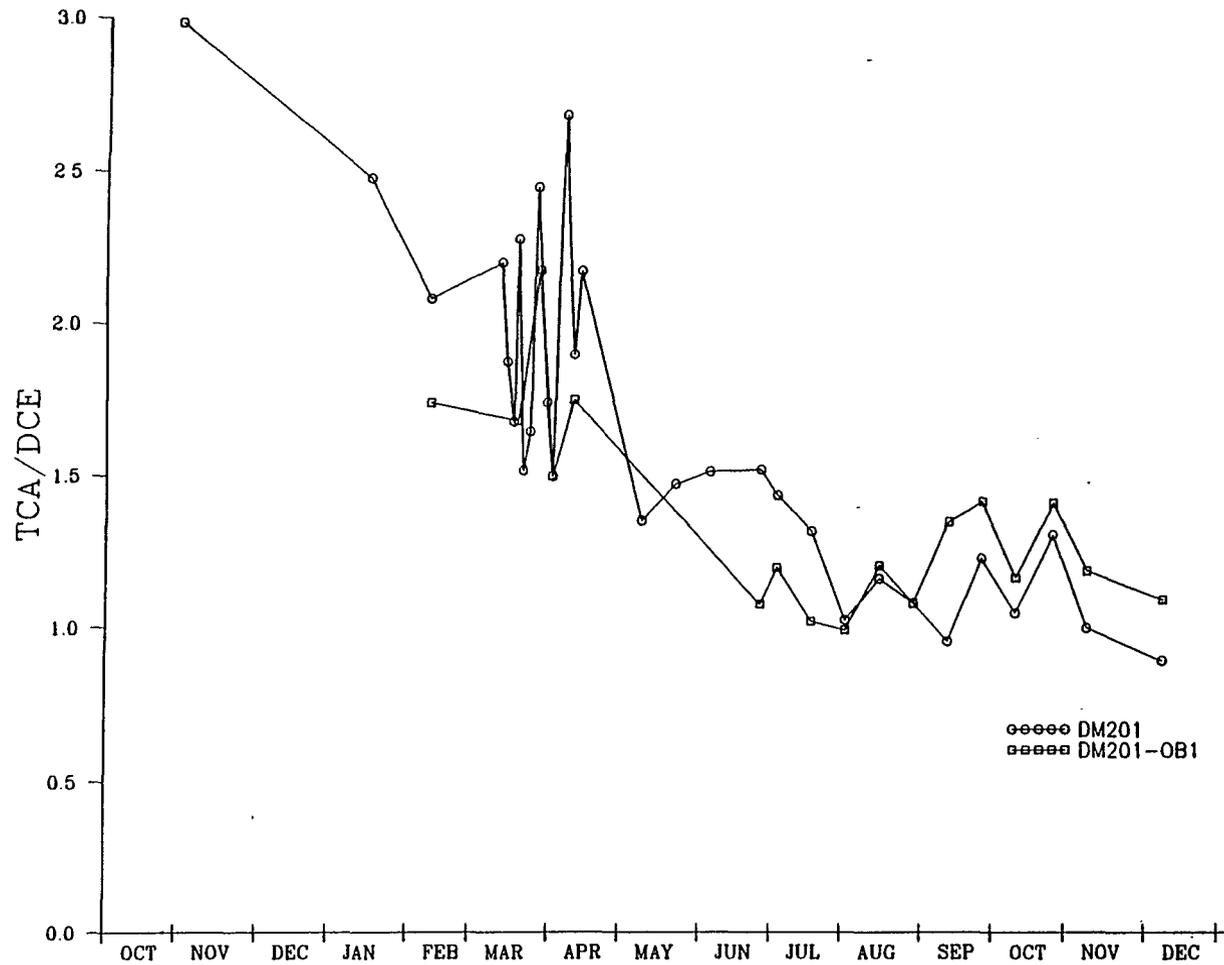


1990

1991

DCE VS. TIME

Figure SW5.2
 MOTOROLA 52nd ST.
 FR RI
 FEBRUARY 1992

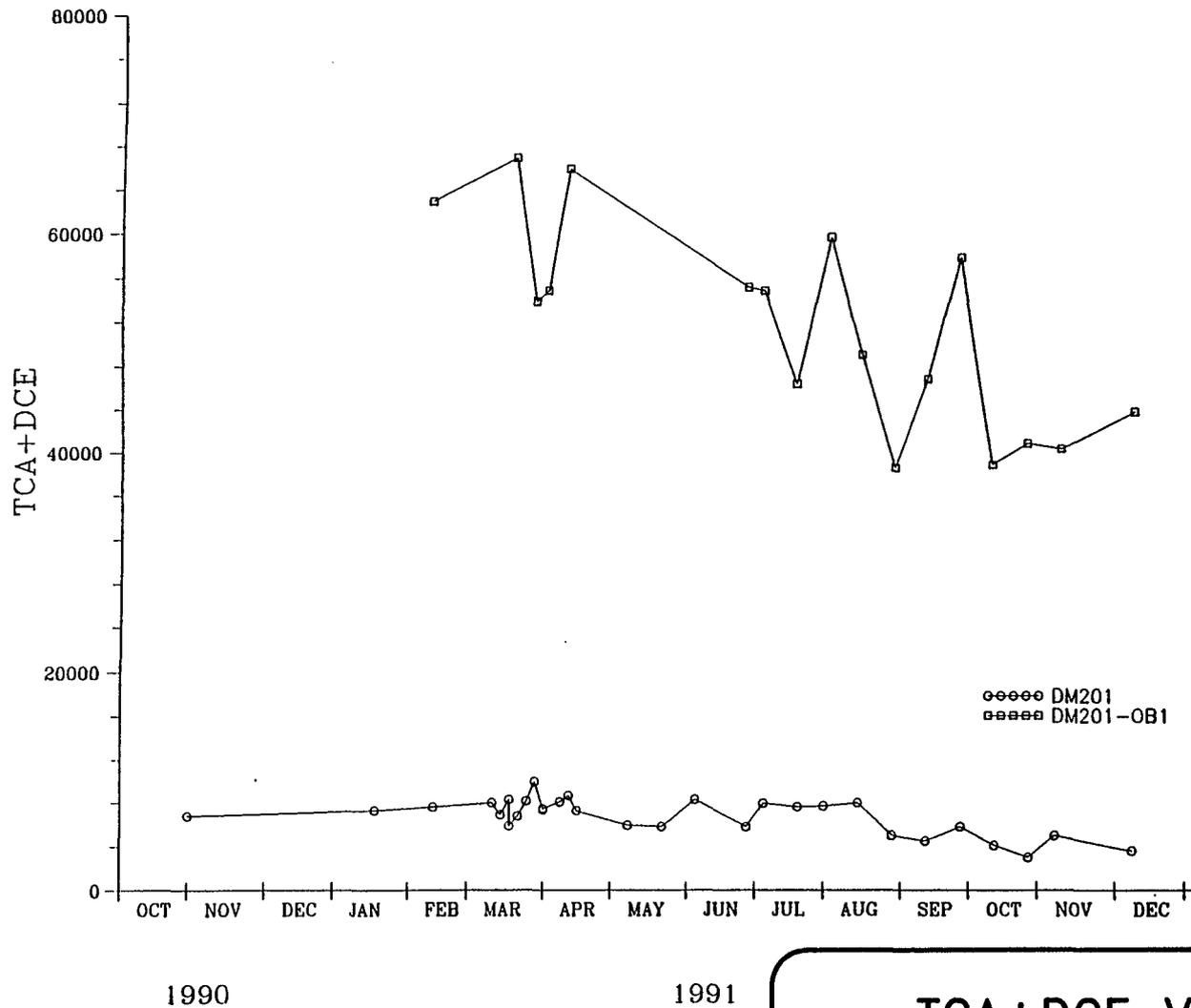


1990

1991

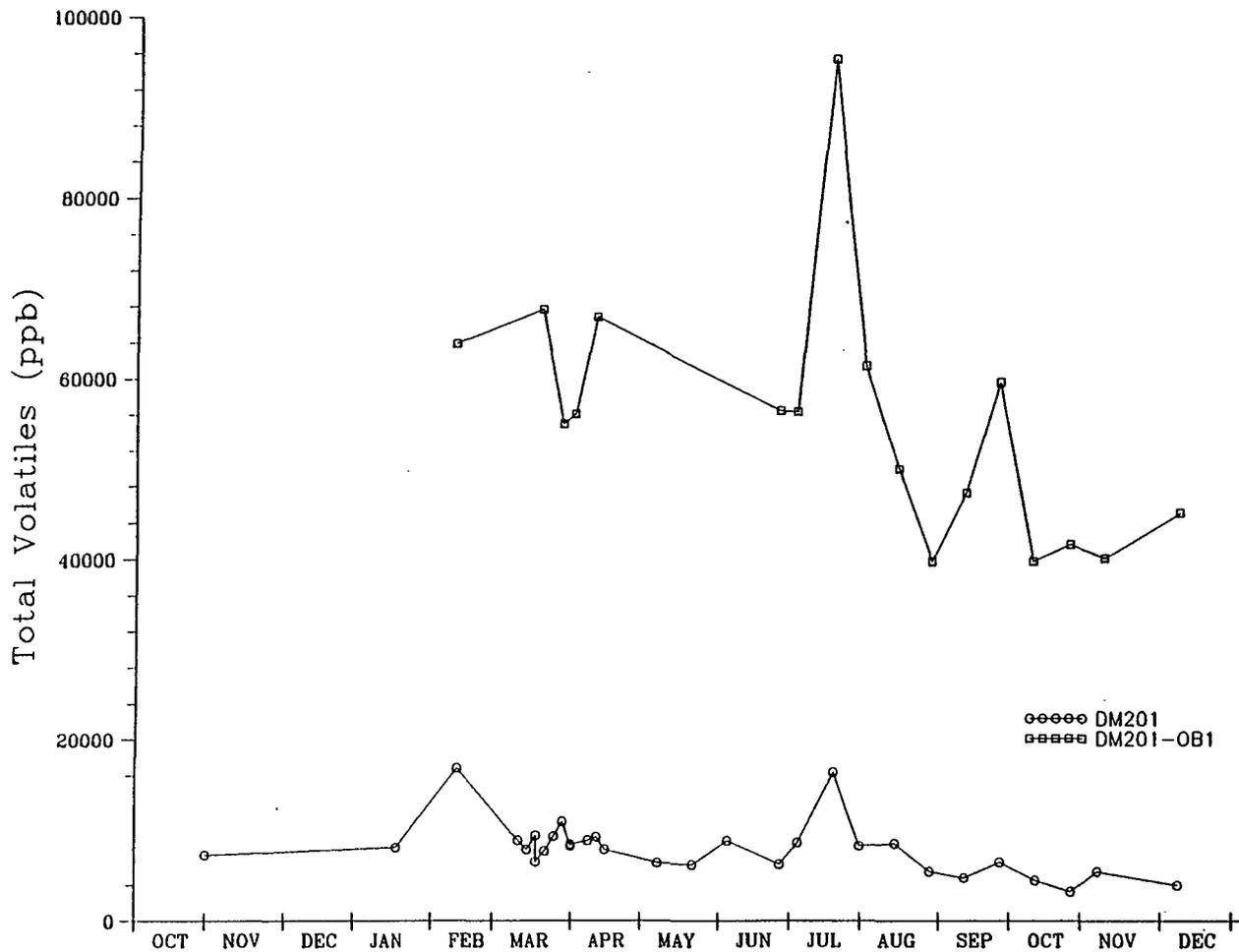
TCA/DCE VS. TIME

Figure SW5.3
 MOTOROLA 52nd ST.
 FR RI
 FEBRUARY 1992



TCA+DCE VS. TIME

Figure SW5.4
 MOTOROLA 52nd ST.
 FR RI
 FEBRUARY 1992



1990

1991

TOTAL VOLATILES VS. TIME

Figure SW5.5
 MOTOROLA 52nd ST.
 FR RI
 FEBRUARY 1992

APPENDICIES

APPENDIX SW-A

CHRONOLOGY OF SWPL EVENTS

The chronology of events in the SWPL area are summarized as follows:

- 1956 - manufacturing operations commenced at Motorola 52nd St. Facility;
- 1974 to 1976 - SWPL area was used for waste chemical storage;
- November 1982 - Motorola discovers a leaking underground TCA storage tank in the Courtyard of the 52nd St. Facility, the Arizona Department of Health Services (ADHS) is notified and a preliminary investigation of soil and ground-water contamination was initiated;
- 1983 - an extensive Remedial Investigation/Feasibility Study (RI/FS) was initiated;
- April 1983 - monitor well MP 16 was installed;
- February/March 1985 - soil-gas investigation in SWPL area which indicated that a potential source of PCE existed in the area between Buildings A-D and A-A (Potential Source SV 2) and in the southwest corner of the SWPL (Potential Source SV 1);
- July/August 1985 - monitor wells DM 201, DM 201OB1, DM 201OB2, and DM 201OB3 were installed and an aquifer test was conducted using DM 201 as the pumping well which resulted in pumping DM 201 dry after pumping it at an average rate of 5.7 gpm for 11 hours;
- August 1985 - water quality samples were collected from monitor well DM 201 and MP 16;
- October/November 1985 - soil gas investigations were conducted in the northern part of the SWPL to study Potential Source 18 and in the southern part of the SWPL to study Potential Sources SV 1 and SV 2;
- October 1985 and November 1985 - monitor well MP 16 was sampled;

Note: The locations of most wells, buildings and other facilities referred to in this chronology can be seen on Figures SW1.2 and SW1.3.

- November 1985 - soil borings 18DA, 18DB, 18DC, 18DD, SV 1DA, SV 2DA, SV 2DB, and SV 2DC were drilled and sampled;
- January 1986 - monitor well DM 107 was installed;
- January 1986 - monitor well MP 16 was sampled;
- March 1986 - monitor wells DM 107 and MP 16 were sampled;
- April 1986 - monitor well DM 107 was sampled;
- June 1986 and May 1987 - monitor wells DM 107 and MP 16 were sampled;
- June 1987 - Draft Remedial Investigation (RI) and Feasibility Study (FS) reports were issued;
- November 1987 and September 1988 - monitor wells DM 107 and MP 16 were sampled;
- June 1988 - Draft Remedial Action Plan (RAP) was issued;
- 1988/1989 - solvent bottling operation was started (including TCA, Freon, and xylenes) in Building A-D after installation of Bulk Storage Tank area located outside of Building A-D and installation of the sump inside of Building A-D;
- January 1989 - monitor wells DM 107, DM 201, and MP 16 were sampled (TCA was less than 0.5 ppb in DM 107);
- January 1989 - soil-gas samples were collected from SWPL area;
- July 26, 1989 - Motorola 52nd St. Consent Order was executed;
- November 1989 monitor wells DM 107 and MP 16 were sampled;
- October/November 1990 - monitor wells DM 107, DM 201, and MP 16 were sampled (TCA was 5,100 ppb in DM 201);
- January 1991 - monitor wells DM 107, DM 201, and MP 16 were sampled (TCA was 5,300 ppb in DM 201);
- February 19, 1991 - increased concentrations of TCA and DCE in monitor well DM 201 are reported and a preliminary work plan was presented by Motorola to EPA, ADEQ, and ADWR at meeting;

- February 1991 - SWPL investigation was initiated including;
 - water levels were measured in SWPL and surrounding wells and elevations contoured to confirm southwest hydraulic gradient,
 - two rounds of water quality samples were collected from monitor wells DM 107, DM 201, DM 201OB1, DM 201OB2, DM 201OB3, and MP 16,
 - monitor well DM 201 was pumped to estimate sustainable yield;
- March 11, 1991 - 8 hours per day, 5 days per week pumping of monitor well DM 201 was initiated;
- March 25 and 26, 1991 - soil-gas investigation was conducted;
- April 19, 1991 - Task Specification for ground-water quality investigation of SWPL was submitted to ADEQ, ADWR, and EPA for review (note: as of February 1992, no comments have been received from the agencies on this Task Specification);
- May 8 and 9, 1991 - eight soil borings were drilled and samples were analyzed using EPA Method 8010/8020 as part of source investigation;
- June 28, 1991 - pump was installed in and pumping was started from monitor well DM 201OB1;
- November 1, 1991 - monitor well DM 701 was installed offsite adjacent to 48th St.;
- October 28 through November 6, 1991 - an additional soil-gas investigation was conducted;
- November 7, 1991 - first round of samples were collected from monitor well DM 701 (EPA Method 601) with the ADEQ, and Geotechnical and Environmental Consultants, Inc. (GEC);
- December 5, 1991 - second round of samples were collected from monitor well DM 701 (EPA Method 601) with the ADEQ and GEC;
- December 12, 1991 - soil samples collected and analyzed from sump in Building A-D (total VOCs in excess of 30,000 mg/kg);

- December 20, 1991 - ADEQ was notified of findings in the Building A-D sump area in a letter from Motorola; and
- December 30, 1991 - third round of samples was collected from monitor well DM 701 (EPA 601 plus inorganics). Samples were not split with the ADEQ or GEC (ADEQ notified, but did not participate).

APPENDIX SW-B
HISTORIC SOIL-GAS INVESTIGATIONS (1985 AND 1989)

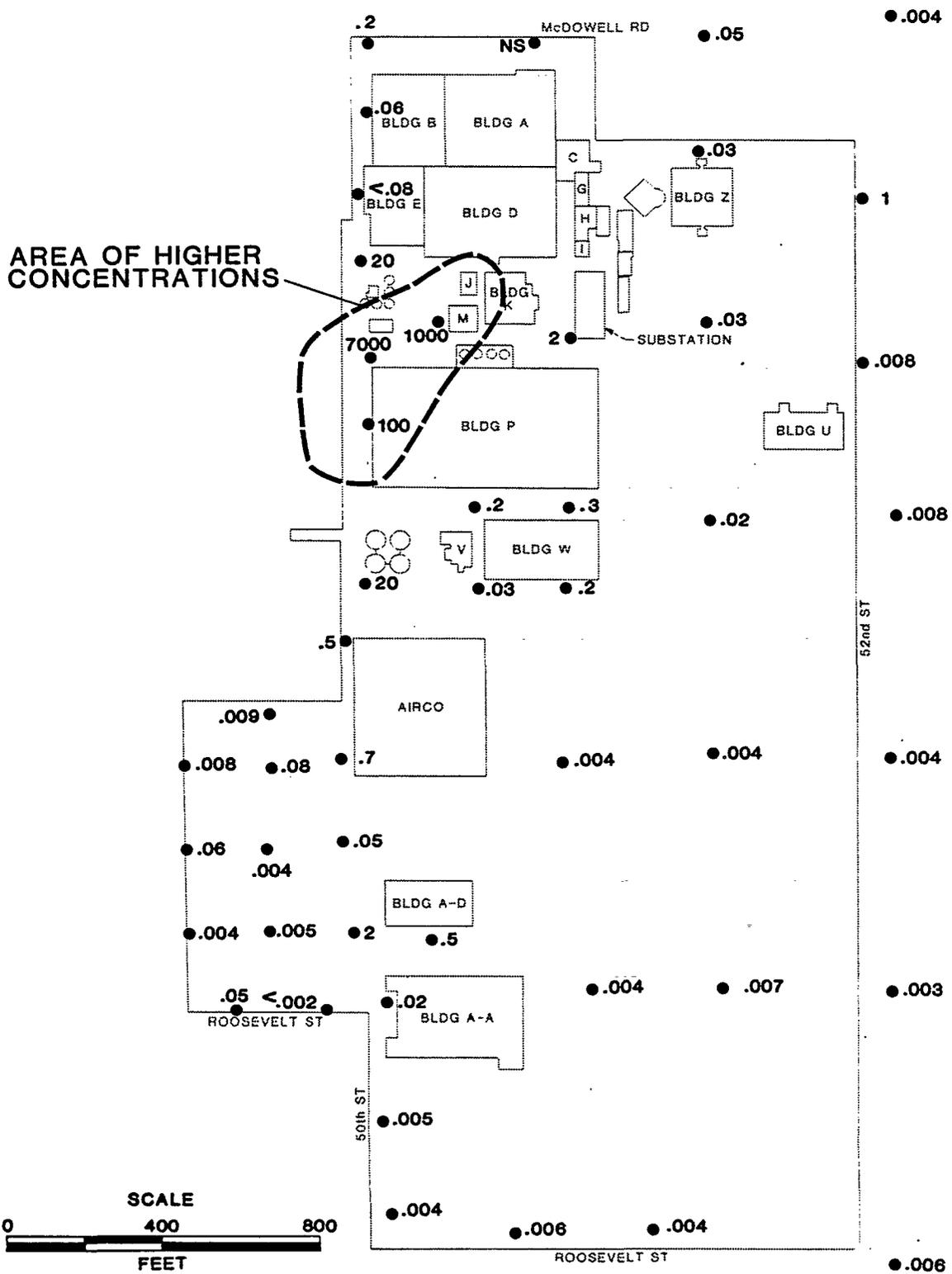
LIST OF FIGURES

- SW-B.1 CONCENTRATIONS OF TCA IN SOIL GAS (ug/l) 1985
- SW-B.2 CONCENTRATIONS OF TCE IN SOIL GAS (ug/l) 1985
- SW-B.3 CONCENTRATIONS OF PCE IN SOIL GAS (ug/l) 1985
- SW-B.4 POTENTIAL SOURCE 18 TCE SOIL GAS (ug/l)
- SW-B.5 POTENTIAL SOURCE 18 PCE SOIL GAS (ug/l)
- SW-B.6 POTENTIAL SOURCES SV 1, SV 2 PCE SOIL GAS (ug/l)
- SW-B.7 POTENTIAL SOURCES SV 1, SV 2 SOIL-GAS PROBES
- SW-B.8 POTENTIAL SOURCE 18 SOIL-GAS PROBES

APPENDIX SW-B - HISTORIC SOIL-GAS INVESTIGATIONS (1985 AND 1989)

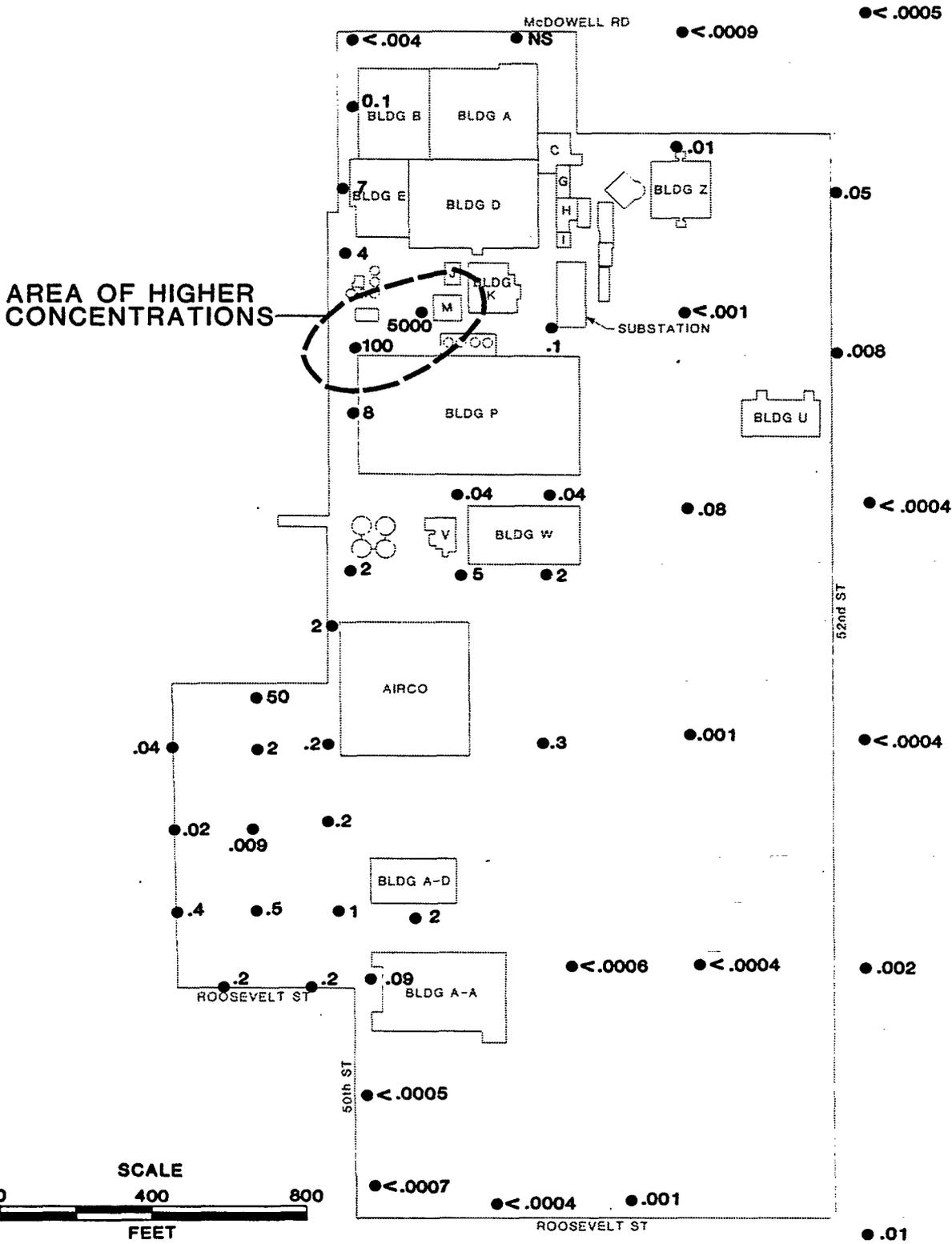
This appendix presents data collected as part of soil-gas investigations conducted during 1985 and 1989. All of the soil gas investigations presented in this appendix were conducted by Tracer Research Corporation of Tucson, Arizona. Figures SW-B.1 through SW-B.3 are TCA, TCE, and PCE soil-gas concentrations observed during February and March 1985. Figures SW-B.4 and SW-B.5 are TCE and PCE soil-gas concentrations observed during October and November 1985 in the northern part of the SWPL (Potential Source 18). Figure SW-B.6 shows PCE concentrations in soil gas in the southern part of the SWPL (Potential Sources SV 1 and SV 2). These six figures are from the 1987 Draft RI Report, which also contains a description of sample collection methods, quality control/quality assurance (QA/QC) methods, and listing of data.

Figures SW-B.7 and SW-B.8 are soil-gas concentrations observed during January 1989 in the Potential Source SV 1 and SV 2 and Potential Source 18 areas, respectively. These figures are modified from the "Task Specification for MI 52nd Street Courtyard SVE Pilot Program for Motorola Inc.," dated December 20, 1990.



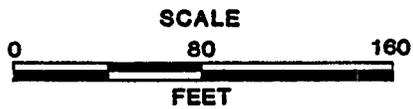
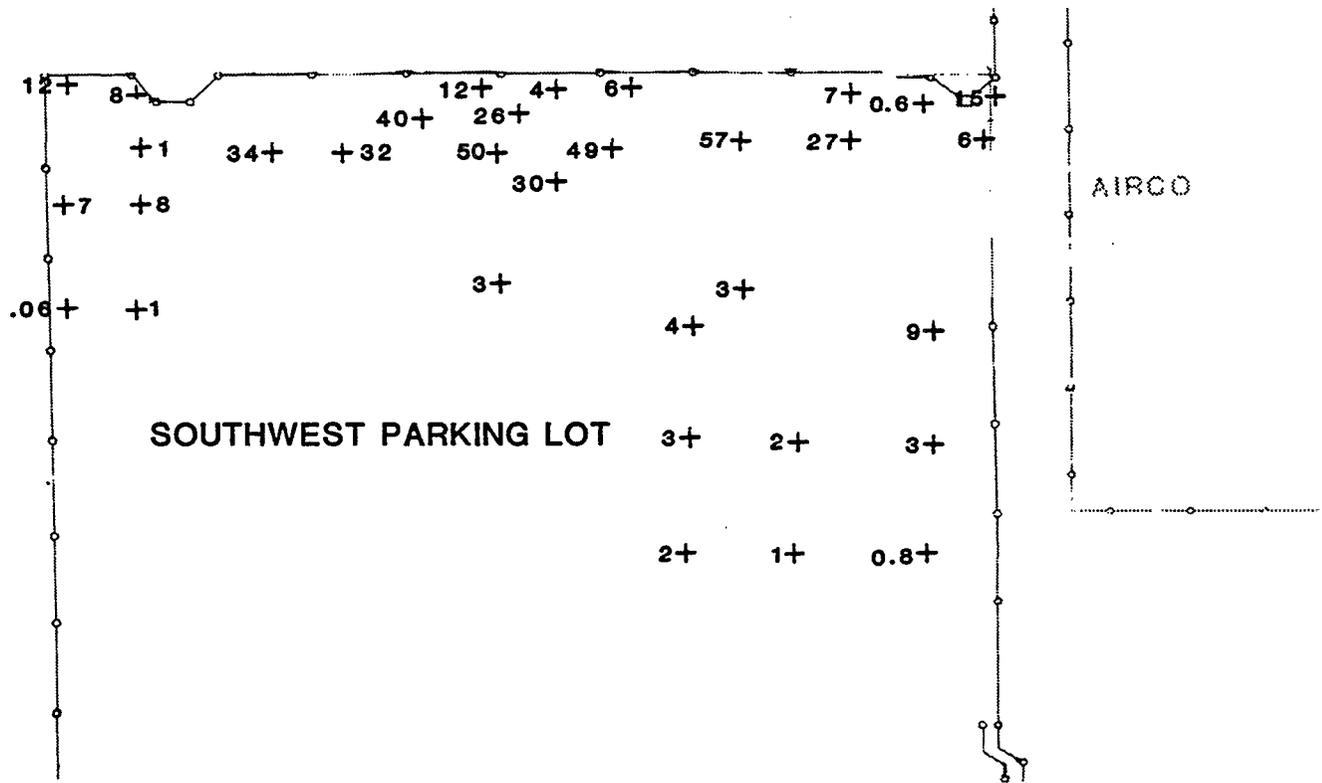
**CONCENTRATIONS OF TCA
IN SOIL GAS (ug/l) 1985**
Figure SW-B.1

REFERENCE: (52nd ST. RI/FS, MOTOROLA INC.,
REMEDIAL INVESTIGATION, 1987)

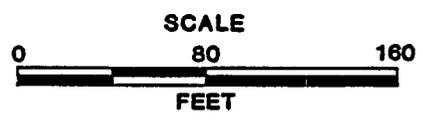
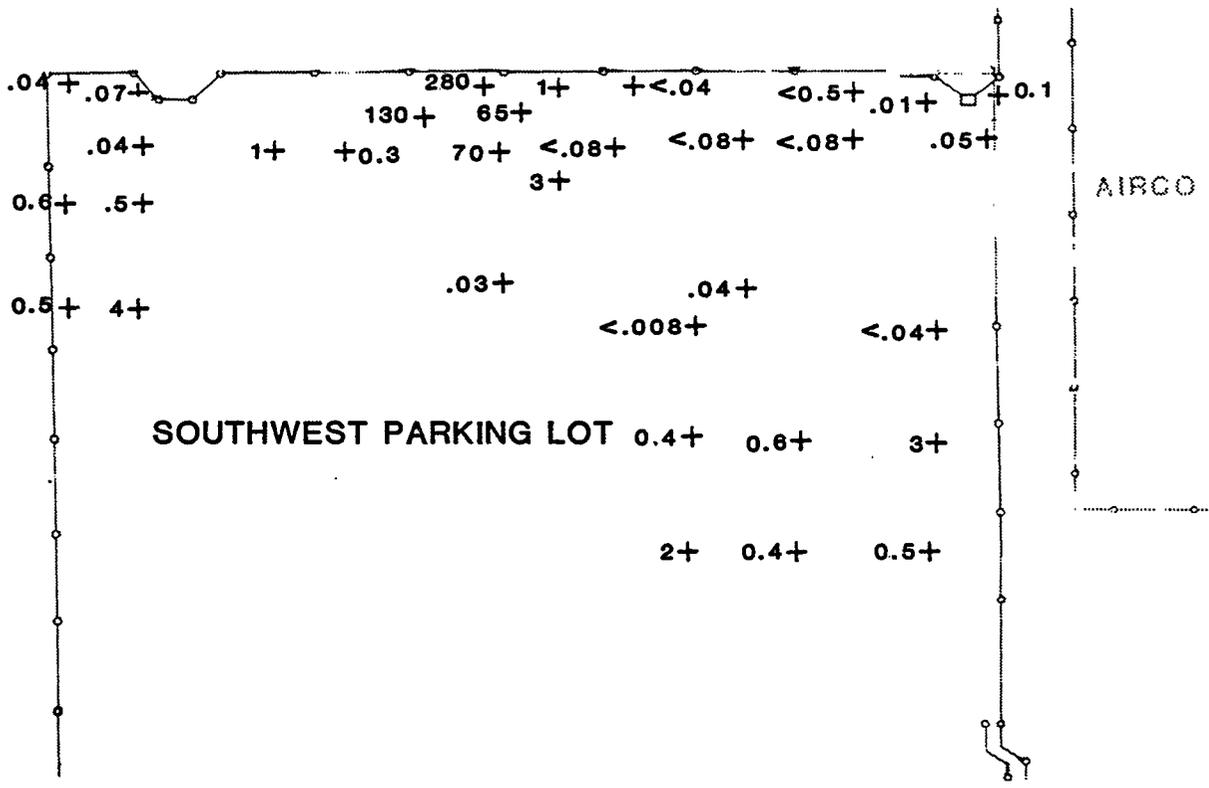


CONCENTRATIONS OF TCE
 IN SOIL GAS (ug/l) 1985
 Figure SW-B.2

REFERENCE: (52nd ST. RI/FS, MOTOROLA INC.,
 REMEDIAL INVESTIGATION, 1987)

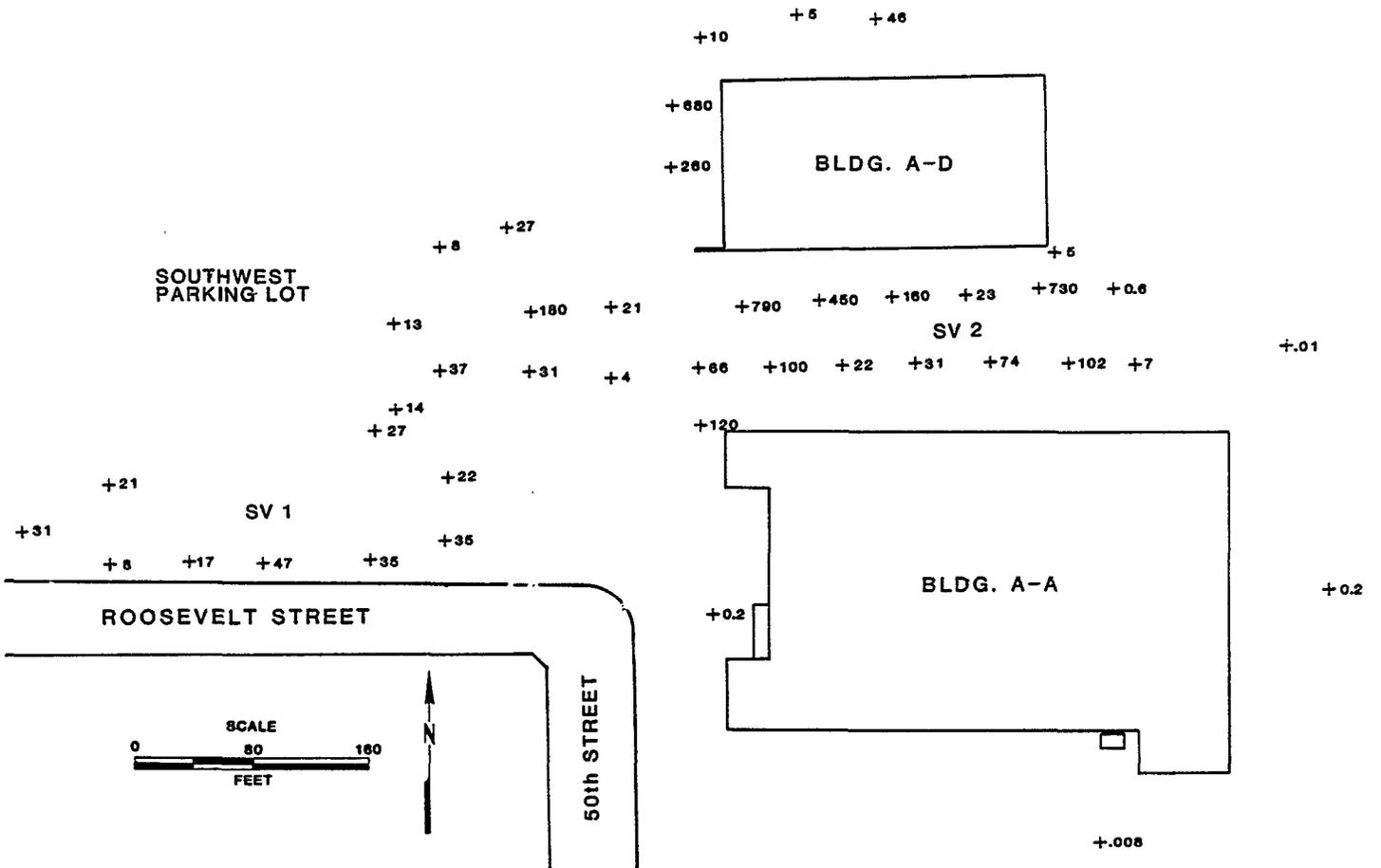


POTENTIAL SOURCE 18
 TCE SOIL GAS (ug/l)
 Figure SW-B.4

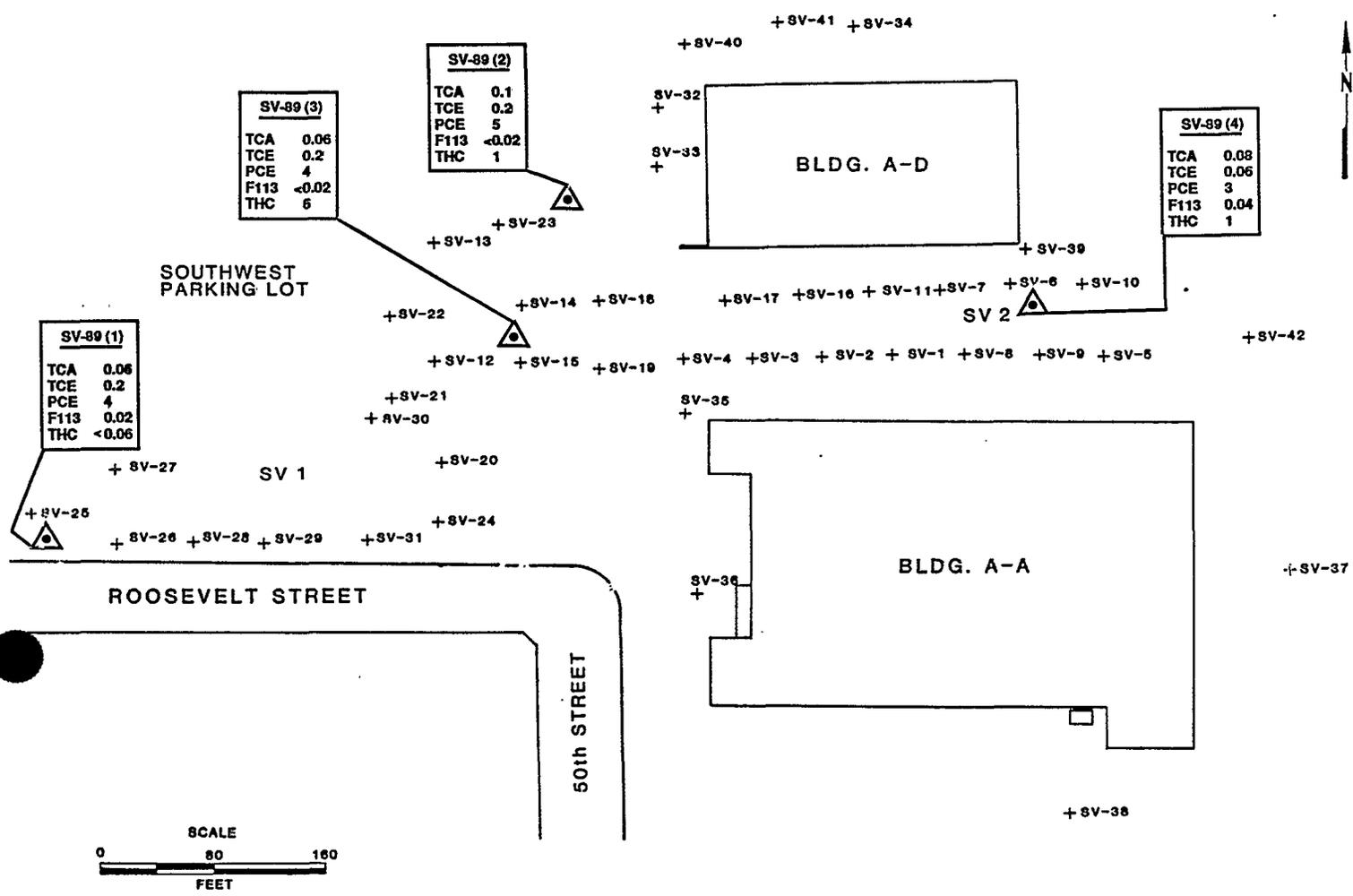


POTENTIAL SOURCE 18
 PCE SOIL GAS (ug/l)
 Figure SW-B.5

REFERENCE: (52nd ST. RI/FS, MOTOROLA INC.,
 REMEDIAL INVESTIGATION, 1987)



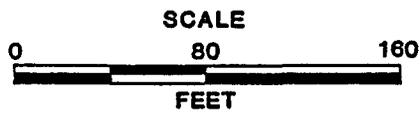
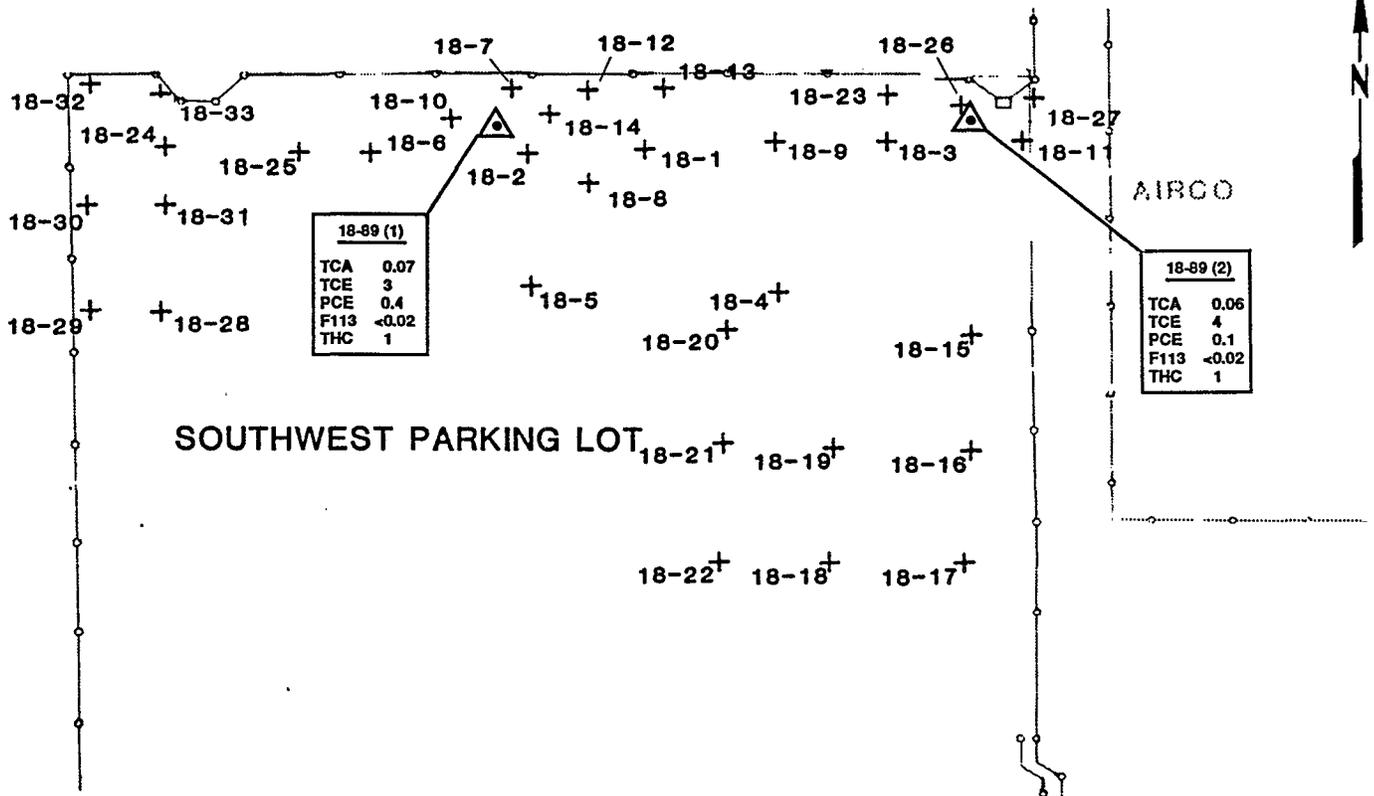
POTENTIAL SOURCES
 SV 1, SV 2
 PCE SOIL GAS (ug/l)
 Figure SW-B:6



+ RIFS SOIL GAS PROBES
 ▲ PLAN C SOIL GAS PROBES
 NOTE: ALL CONCENTRATIONS IN ug/l.

POTENTIAL SOURCES SV1, SV2 SOIL-GAS PROBES Figure SW-B.7

REFERENCE: SUBMITTAL NO.3, 30% DESIGN PACKAGES
 MI52 CONSENT ORDER 3/15/90.



+ RIFS SOIL- GAS PROBES

▲ PLAN C SOIL- GAS PROBES

NOTE: ALL CONCENTRATIONS IN ug/l.

POTENTIAL SOURCE 18 SOIL- GAS PROBES

Figure SW-B.8

REFERENCE: SUBMITTAL NO.3, 30% DESIGN PACKAGES
MIS2 CONSENT ORDER 3/15/90.

APPENDIX SW-C

WATER QUALITY DATA (1985 THROUGH 1991)

Water quality data for samples collected from 1985 through 1991 from SWPL area monitor wells including DM 107, DM 123, DM 124, DM 201, DM 201OB1, DM 201OB2, DM 201OB3, DM 503, DM 701, MP 16, MP 20, MP 52, MP 53, and 48&VB (Langmade) are listed in Table SW-C.1. These data are for samples analyzed using EPA Method 601 and in some cases EPA Method 602. Sample collection methods, quality assurance/quality control (QA/QC) methods and data, qualifiers, and field measurements associated with these data are provided in Appendix E of the February 1992 FR RI Report.

TABLE SW-C.1
SWPL VOCS IN PPB

MI52 FR RI REPORT
February 1992

WELL	48&VB	48&VB	48&VB	DM107	DM107	DM107	DM107	DM107	DM107	DM107
DATE	10/03/85	03/06/86	06/04/86	03/20/86	04/03/86	06/18/86	05/27/87	05/27/87	11/20/87	09/19/88
SAMPLE CODE	FO	FO	FO	FO	FO	FO	FD	FO	FO	FD
BROMODICHLOROMETHANE	<1	<0.5	<0.1	<10	<0.5	<1	<0.05	<0.05	<1	<3
BROMOFORM	<2	<0.5	<0.5	<20	<0.5	<2	<0.1	<0.1	<2	<5
BROMOMETHANE	<12	<2	<2	<200	<2	<12	<0.1	<0.1	<12	<30
CARBON TETRACHLORIDE	<2	<0.5	<0.5	<12	<0.5	<2	<0.1	<0.1	<2	<3
CHLORO BENZENE	<3	<0.5	<0.5	<25	<0.5	<3	<0.5	<0.5	<3	<7
CHLOROETHANE	<6	<1	<1	<60	<1	<6	<0.1	<0.1	<6	<13
CHLOROFORM	<1	<0.1	<0.05	<5	0.92	1.8	<0.05	<0.05	<0.5	<2
CHLOROMETHANE	<0.5	<0.1	<0.1	<8	<0.1	<1	<0.05	<0.05	<1	<2
DIBROMOCHLOROMETHANE	<1	<0.1	<0.1	<9	<0.1	<1	<0.1	<0.1	<1	<3
1,3-DICHLORO BENZENE	.	.	.	.	.	.	<0.5	<0.5	<4	<8
1,2&1,4-DICHLORO BENZENE	.	.	.	.	.	.	.	.	.	.
DICHLORODIFLUOROMETHANE	<20	<2	<2	<200	<2	<20	<0.05	<0.05	<19	<50
1,1-DICHLOROETHANE	<1	<0.1	<0.1	<7	<0.1	<1	<0.05	<0.05	<1	<2
1,2-DICHLOROETHANE	<0.5	<0.05	<0.05	<3	<0.05	<0.5	<0.1	<0.1	<0.5	<1
1,1-DICHLOROETHENE	<2	<0.5	<0.5	<13	14.3	<2	<0.1	<0.1	5.3	32
1,2-DICHLOROETHENE(TOTAL)	<1	<0.5	<0.1	<10	9	7.7	<0.1	<0.1	5.7	<3
1,2-DICHLOROPROPANE	<0.5	<0.05	<0.05	<4	<0.05	<0.5	<0.05	<0.05	<0.5	<1
CIS-1,3-DICHLOROPROPENE	<2	<0.5	<0.5	<20	<0.5	<2	<0.1	<0.1	<2	<5
TRANS-1,3-DICHLOROPROPENE	<4	<0.5	<0.5	<35	<0.5	<4	<0.5	<0.5	<4	<9
METHYLENE CHLORIDE	20.3	<0.5	<0.5	<25	<0.5	<3	<0.05	<0.05	<3	<7
1,1,2,2-TETRACHLOROETHANE	<0.5	<0.05	<0.05	<3	<0.05	<0.5	<0.05	<0.05	<0.5	<1
TETRACHLOROETHENE	2.4	1.4	<0.05	<3	45.4	<0.5	<0.05	<0.05	<0.5	<1
1,1,1-TRICHLOROETHANE	40.7	8.9	<0.05	190	5.2	<0.5	<0.05	<0.05	2	<1
1,1,2-TRICHLOROETHANE	<0.5	<0.05	<0.05	<2	<0.05	<0.5	<0.05	<0.05	<0.5	<0.5
TRICHLOROETHENE	26.8	1	<0.5	345	230	290	265	286	367	440
TRICHLOROFLUOROMETHANE	<5	<1	<0.5	<50	<1	<5	<0.1	<0.1	<10	<25
VINYL CHLORIDE	<2	<0.5	<0.5	<18	<0.5	<2	<0.05	<0.05	<2	<5
TRICHLOROTRIFLUOROETHANE	13.9	1.9	<0.5	<50	4	<5	<0.05	<0.05	<20	<25
2-CHLOROETHYL VINYL ETHER	<2	<0.5	<0.5	<15	<0.5	<2	<0.05	<0.05	<2	<4
BENZENE	.	.	.	.	.	.	<0.5	<0.5	.	.
TOLUENE	.	.	.	.	.	.	<0.5	<0.5	.	.
ETHYLBENZENE	.	.	.	.	.	.	<0.1	<0.1	.	.
1,2-DICHLORO BENZENE	.	.	.	.	.	.	<0.5	<0.5	<2	<4
1,4-DICHLORO BENZENE	.	.	.	.	.	.	<1	<1	<3	<6
ACETONE	.	.	.	.	.	.	<50	<50	.	.
O,P-XYLENE	.	.	.	.	.	.	<0.5	<0.5	.	.
M-XYLENE	.	.	.	.	.	.	<0.5	<0.5	.	.

TABLE SW-C.1
SWPL VOCS IN PPB

MI52 FR RI REPORT
February 1992

WELL	DM107 09/19/88	DM107 01/17/89	DM107 01/17/89	DM107 11/30/89	DM107 11/30/89	DM107 11/05/90	DM107 11/05/90	DM107 01/22/91	DM107 02/11/91	DM107 07/01/91
DATE	FO	FD	FO	FD	FO	FD	FO	FO	FO	FO
SAMPLE CODE	FO	FD	FO	FD	FO	FD	FO	FO	FO	FO
BROMODICHLOROMETHANE	<3	<1	<1	<5	<5	5.4	5.1	3.9	2.3	1.8
BROMOFORM	<5	<2	<2	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2
BROMOMETHANE	<30	<12	<12	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<3	<2	<2	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROBENZENE	<7	<3	<3	<12.5	<12.5	<0.5	<0.5	<0.5	<0.5	<0.5
CHLOROETHANE	<13	<6	<6	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROFORM	<2	<0.5	<0.5	7.5	<5	12.7	13.9	6.5	7.7	5
CHLOROMETHANE	<2	<1	<1	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<3	<1	<1	<5	<5	0.6	0.5	0.22	<0.2	<0.2
1,3-DICHLOROBENZENE	<8	<4	<4	<12.5	<12.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2&1,4-DICHLOROBENZENE	.	.	.	<12.5	<12.5	<0.5	<0.5	0.62	<0.5	<0.5
DICHLORODIFLUOROMETHANE	<50	<19	<19	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	<2	<1	<1	<5	<5	<0.2	<0.2	0.8	<0.2	<0.2
1,2-DICHLOROETHANE	<1	<0.5	<0.5	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHENE	330	<2	<2	<5	<5	1.4	1	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (TOTAL)	<3	<1	<1	8.3	<5	<0.2	<0.2	0.21	<0.2	0.6
1,2-DICHLOROPROPANE	<1	<0.5	<0.5	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<5	<2	<2	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2
TRANS-1,3-DICHLOROPROPENE	<9	<4	<4	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2
METHYLENE CHLORIDE	<7	<3	<3	<50	<50	<2	<2	<2	<2	<2
1,1,2,2-TETRACHLOROETHANE	<1	<0.5	<0.5	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2
TETRACHLOROETHENE	<1	<0.5	<0.5	<5	<5	2.6	2.2	2.8	0.5	0.3
1,1,1-TRICHLOROETHANE	<1	<0.5	<0.5	<5	<5	6.7	6.3	1.6	<0.2	<0.2
1,1,2-TRICHLOROETHANE	<0.5	<0.5	<0.5	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2
TRICHLOROETHENE	1100	353	309	290	190	4.8	4.8	6.7	9.8	50.8
TRICHLOROFUOROMETHANE	<25	<10	<10	<12.5	<12.5	<0.5	<0.5	<0.5	<0.5	<0.5
VINYL CHLORIDE	<5	<2	<2	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2
TRICHLOROTRIFLUOROETHANE	<25	<10	<10	6.7	7.8	<2	<2	<2	<2	<2
2-CHLOROETHYL VINYL ETHER	<4	<2	<2	<5	<5	<0.2	<0.2	<0.2	<0.2	<0.2
BENZENE	.	.	.	.	.	.	.	.	.	.
TOLUENE	.	.	.	.	.	.	.	.	.	.
ETHYLBENZENE	.	.	.	.	.	.	.	.	.	.
1,2-DICHLOROBENZENE	<4	<2	<2	.	.	.	.	.	.	.
1,4-DICHLOROBENZENE	<6	<3	<3	.	.	.	.	.	.	.
ACETONE	.	.	.	.	.	.	.	.	.	.
O,P-XYLENE	.	.	.	.	.	.	.	.	.	.
M-XYLENE	.	.	.	.	.	.	.	.	.	.

TABLE SW-C.1
SWPL VOCS IN PPB

MI52 FR RI REPORT
February 1992

WELL	DM123-056 08/28/86	DM123-056 08/28/86	DM123-056 09/11/86	DM123-056 09/11/86	DM123-056 01/22/91	DM123-085 08/28/86	DM123-085 09/11/86	DM123-085 01/22/91	DM123-085 01/22/91	DM123-135 08/28/86
DATE	FD	F0	FD	F0	F0	F0	F0	F0	F0	F0
BROMODICHLOROMETHANE	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.2	<0.2	<0.1
BROMOFORM	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.2	<0.2	<0.5
BROMOMETHANE	<2	<2	<2	<2	<0.2	<2	<2	<0.2	<0.2	<2
CARBON TETRACHLORIDE	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.2	<0.2	<0.5
CHLOROBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
CHLOROETHANE	<1	<1	<1	<1	<0.2	<1	<1	<0.2	<0.2	<1
CHLOROFORM	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.2	<0.2	<0.05
CHLOROMETHANE	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.2	<0.2	<0.1
DIBROMOCHLOROMETHANE	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.2	<0.2	<0.1
1,3-DICHLOROBENZENE	.	.	.	.	<0.5	.	.	<0.5	<0.5	.
1,2&1,4-DICHLOROBENZENE	.	.	.	.	<0.5	.	.	<0.5	<0.5	.
DICHLORODIFLUOROMETHANE	<2	<2	<2	<2	<0.2	<2	<2	<0.2	<0.2	<2
1,1-DICHLOROETHANE	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.2	<0.2	<0.1
1,2-DICHLOROETHANE	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.2	<0.2	<0.05
1,1-DICHLOROETHENE	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.2	<0.2	<0.5
1,2-DICHLOROETHENE (TOTAL)	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.2	<0.2	<0.1
1,2-DICHLOROPROPANE	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.2	<0.2	<0.05
CIS-1,3-DICHLOROPROPENE	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.2	<0.2	<0.5
TRANS-1,3-DICHLOROPROPENE	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.2	<0.2	<0.5
METHYLENE CHLORIDE	<0.5	<0.5	<0.5	<0.5	6	<0.5	<0.5	<2	3.2	<0.5
1,1,2,2-TETRACHLOROETHANE	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.2	<0.2	<0.05
TETRACHLOROETHENE	<0.05	0.08	<0.05	<0.05	<0.2	<0.05	<0.05	<0.2	<0.2	<0.05
1,1,1-TRICHLOROETHANE	0.08	0.72	13.7	1.8	<0.2	0.09	2.7	<0.2	<0.2	1.5
1,1,2-TRICHLOROETHANE	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.2	<0.2	<0.05
TRICHLOROETHENE	0.18	0.19	<0.5	<0.5	<0.2	<0.5	<0.5	<0.2	<0.2	<0.5
TRICHLOROFLUOROMETHANE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
VINYL CHLORIDE	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.2	<0.2	<0.5
TRICHLOROTRIFLUOROETHANE	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	<2	<2	<0.5
2-CHLOROETHYL VINYL ETHER	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.2	<0.2	<0.5
BENZENE	.	.	.	.	.	.	.	.	.	.
TOLUENE	.	.	.	.	.	.	.	.	.	.
ETHYLBENZENE	.	.	.	.	.	.	.	.	.	.
1,2-DICHLOROBENZENE	.	.	.	.	.	.	.	.	.	.
1,4-DICHLOROBENZENE	.	.	.	.	.	.	.	.	.	.
ACETONE	.	.	.	.	.	.	.	.	.	.
O,P-XYLENE	.	.	.	.	.	.	.	.	.	.
M-XYLENE	.	.	.	.	.	.	.	.	.	.

TABLE SW-C.1
SWPL VOCS IN PPB

MI52 FR RI REPORT
February 1992

WELL	DM123-135 09/11/86	DM123-135 01/22/91	DM123-195 08/28/86	DM123-195 09/11/86	DM123-195 01/22/91	DM123-250 08/28/86	DM123-250 09/11/86	DM123-250 01/22/91	DM123-285 08/28/86	DM123-285 09/11/86
DATE	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO
SAMPLE CODE	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO
BROMODICHLOROMETHANE	<0.1	<0.2	<0.1	<0.1	<0.2	<0.1	<0.1	<0.2	<0.1	<0.1
BROMOFORM	<0.5	<0.2	<0.5	<0.5	<0.2	<0.5	<0.5	<0.2	<0.5	<0.5
BROMOMETHANE	<2	<0.2	<2	<2	<0.2	<2	<2	<0.2	<2	<2
CARBON TETRACHLORIDE	<0.5	<0.2	<0.5	<0.5	<0.2	<0.5	<0.5	<0.2	<0.5	<0.5
CHLORO BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
CHLOROETHANE	<1	<0.2	<1	<1	<0.2	<1	<1	<0.2	<1	<1
CHLOROFORM	<0.05	<0.2	<0.05	<0.05	<0.2	<0.05	<0.05	<0.2	<0.05	<0.05
CHLOROMETHANE	<0.1	<0.2	<0.1	<0.1	<0.2	<0.1	<0.1	<0.2	<0.1	<0.1
DIBROMOCHLOROMETHANE	<0.1	<0.2	<0.1	<0.1	<0.2	<0.1	<0.1	<0.2	<0.1	<0.1
1,3-DICHLORO BENZENE	.	<0.5	.	.	<0.5	.	.	<0.5	.	.
1,2&1,4-DICHLORO BENZENE	.	<0.5	.	.	<0.5	.	.	<0.5	.	.
DICHLORODIFLUOROMETHANE	<2	<0.2	<2	<2	<0.2	<2	<2	<0.2	<2	<2
1,1-DICHLOROETHANE	<0.1	<0.2	<0.1	<0.1	<0.2	<0.1	<0.1	<0.2	<0.1	<0.1
1,2-DICHLOROETHANE	<0.05	<0.2	<0.05	<0.05	<0.2	<0.05	<0.05	<0.2	<0.05	<0.05
1,1-DICHLOROETHENE	<0.5	<0.2	<0.5	<0.5	<0.2	<0.5	<0.5	<0.2	<0.5	<0.5
1,2-DICHLOROETHENE(TOTAL)	<0.1	<0.2	<0.1	<0.1	<0.2	<0.1	<0.1	<0.2	<0.1	<0.1
1,2-DICHLOROPROPANE	<0.05	<0.2	<0.05	<0.05	<0.2	<0.05	<0.05	<0.2	<0.05	<0.05
CIS-1,3-DICHLOROPROPENE	<0.5	<0.2	<0.5	<0.5	<0.2	<0.5	<0.5	<0.2	<0.5	<0.5
TRANS-1,3-DICHLOROPROPENE	<0.5	<0.2	<0.5	<0.5	<0.2	<0.5	<0.5	<0.2	<0.5	<0.5
METHYLENE CHLORIDE	<0.5	2.7	<0.5	<0.5	<2	<0.5	<0.5	<2	<0.5	<0.5
1,1,2,2-TETRACHLOROETHANE	<0.05	<0.2	<0.05	<0.05	<0.2	<0.05	<0.05	<0.2	<0.05	<0.05
TETRACHLOROETHENE	<0.05	<0.2	<0.05	<0.05	<0.2	<0.05	<0.05	<0.2	<0.05	<0.05
1,1,1-TRICHLOROETHANE	3.5	<0.2	1.1	11	<0.2	4.3	3.2	<0.2	2.9	1.7
1,1,2-TRICHLOROETHANE	<0.05	<0.2	<0.05	<0.05	<0.2	<0.05	<0.05	<0.2	<0.05	<0.05
TRICHLOROETHENE	<0.5	<0.2	<0.5	<0.5	<0.2	<0.5	<0.5	<0.2	<0.5	<0.5
TRICHLOROFLUOROMETHANE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
VINYL CHLORIDE	<0.5	<0.2	<0.5	<0.5	<0.2	<0.5	<0.5	<0.2	<0.5	<0.5
TRICHLORO TRIFLUOROETHANE	<0.5	<2	<0.5	<0.5	<2	<0.5	<0.5	<2	<0.5	<0.5
2-CHLOROETHYL VINYL ETHER	<0.5	<0.2	<0.5	<0.5	<0.2	<0.5	<0.5	<0.2	<0.5	<0.5
BENZENE	.	.	.	.	.	.	.	.	.	.
TOLUENE	.	.	.	.	.	.	.	.	.	.
ETHYLBENZENE	.	.	.	.	.	.	.	.	.	.
1,2-DICHLORO BENZENE	.	.	.	.	.	.	.	.	.	.
1,4-DICHLORO BENZENE
ACETONE
O,P-XYLENE
M-XYLENE

TABLE SW-C.1
SWPL VOCS IN PPB

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WELL	DM123-285	DM124	DM124	DM124	DM124	DM124	DM124	DM201	DM201	DM201	DM201
DATE	01/22/91	07/30/86	08/19/86	10/30/90	01/02/91	06/28/91	08/13/85	01/17/89	10/31/90	01/18/91	
SAMPLE CODE	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO	
BROMODICHLOROMETHANE	<0.2	<0.1	<0.1	<0.2	<0.2	0.3	<1	<1	<10	<10	
BROMOFORM	<0.2	<0.5	<0.5	<0.2	<0.2	<0.2	<2	<2	<10	<10	
BROMOMETHANE	<0.2	<2	<2	<0.2	<0.2	<0.2	<20	<12	<10	<10	
CARBON TETRACHLORIDE	<0.2	<0.5	0.77	<0.2	<0.2	<0.2	<2	<2	<10	<10	
CHLOROBENZENE	0.54	<0.5	<0.05	<0.5	<0.5	<0.5	<5	<3	<25	<25	
CHLOROETHANE	<0.2	<1	<1	<0.2	<0.2	<0.2	<10	<6	<10	<10	
CHLOROFORM	<0.2	<0.05	<0.05	0.5	0.5	4.2	19.2	<0.5	<10	<10	
CHLOROMETHANE	<0.2	<0.1	<0.1	<0.2	<0.2	<0.2	<1	<1	<10	<10	
DIBROMOCHLOROMETHANE	<0.2	<0.1	<0.1	<0.2	<0.2	<0.2	<1	<1	<10	<10	
1,3-DICHLOROBENZENE	<0.5	.	.	<0.5	<0.5	<0.5	.	<4	<25	<25	
1,2&1,4-DICHLOROBENZENE	<0.5	.	.	<0.5	2.1	<0.5	.	.	<25	<25	
DICHLORODIFLUOROMETHANE	<0.2	<2	<2	<0.2	<0.2	<0.2	<20	<19	<10	<10	
1,1-DICHLOROETHANE	<0.2	<0.1	0.86	<0.2	<0.2	0.7	<1	<1	50	170	
1,2-DICHLOROETHANE	<0.2	5.1	<0.05	<0.2	<0.2	<0.2	<0.5	<0.5	<10	<10	
1,1-DICHLOROETHENE	<0.2	<0.5	<0.5	<0.2	<0.2	0.3	32.6	<2	1710	2100	
1,2-DICHLOROETHENE(TOTAL)	<0.2	<0.1	<0.1	<0.2	0.3	<0.2	<1	<1	<10	50	
1,2-DICHLOROPROPANE	<0.2	<0.05	<0.05	<0.2	<0.2	<0.2	<0.5	<0.5	<10	<10	
CIS-1,3-DICHLOROPROPENE	<0.2	<0.5	<0.5	<0.2	<0.2	<0.2	<2	<2	<10	<10	
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.5	<0.5	<0.2	<0.2	<0.2	<5	<4	<10	<10	
METHYLENE CHLORIDE	<2	<0.5	<0.5	<2	<2	<2	<5	<3	<100	<100	
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.05	<0.05	<0.2	<0.2	<0.2	<1	<0.5	<10	<10	
TETRACHLOROETHENE	<0.2	3.7	3.1	1.7	2.4	3.8	56	214	440	580	
1,1,1-TRICHLOROETHANE	<0.2	<0.05	<0.05	1.9	0.3	<0.2	80	<0.5	5100	5200	
1,1,2-TRICHLOROETHANE	<0.2	<0.05	<0.05	<0.2	<0.2	<0.2	<0.5	<0.5	<10	<10	
TRICHLOROETHENE	<0.2	2.9	6.7	38.9	3.3	1.6	241	27.81	25	50	
TRICHLOROFLUOROMETHANE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<10	<25	<25	
VINYL CHLORIDE	<0.2	<0.5	<0.5	<0.2	<0.2	<0.2	<2	<2	<10	<10	
TRICHLOROTRIFLUOROETHANE	<2	<0.5	1.4	<2	3	3	.	<10	<100	<100	
2-CHLOROETHYL VINYL ETHER	<0.2	<0.5	<0.5	<0.2	<0.2	<0.2	<2	<2	<10	<10	
BENZENE	.	.	.	.	.	.	.	.	.	.
TOLUENE	.	.	.	.	.	.	.	.	.	.
ETHYLBENZENE	.	.	.	.	.	.	.	.	.	.
1,2-DICHLOROBENZENE	.	.	.	.	.	.	.	<2	.	.
1,4-DICHLOROBENZENE	<3	.	.	
ACETONE	
O,P-XYLENE	
M-XYLENE	

TABLE SW-C.1
SWPL VOCS IN PPB

MIS2 FR RI REPORT
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WELL	DM201									
DATE	02/12/91	02/12/91	03/13/91	03/15/91	03/18/91	03/20/91	03/22/91	03/25/91	03/28/91	04/01/91
SAMPLE CODE	FD	FO	PT	PT	PT	PT	PT	PT	PT	PT
BROMODICHLOROMETHANE	<10	<10	<0.2	<0.2	0.8	<0.2	<1	0.3	<0.2	<0.2
BROMOFORM	<10	<10	<0.2	<0.2	<0.2	<0.2	<1	6.3	<0.2	<0.2
BROMOMETHANE	<10	<10	<0.2	<0.2	<0.2	<0.2	<1	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<10	<10	<0.2	<0.2	<0.2	<0.2	<1	<0.2	<0.2	<0.2
CHLOROBENZENE	<25	<25	1.7	9.7	5	<0.5	<2.5	19.5	<0.5	2.5
CHLOROETHANE	<10	<10	<0.2	<0.2	<0.2	<0.2	<1	<0.2	<0.2	<0.2
CHLOROFORM	<10	<10	4.5	3.4	1.4	3.4	3	<0.2	<0.2	4
CHLOROMETHANE	<10	<10	<0.2	<0.2	<0.2	<0.2	<1	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<10	<10	<0.2	<0.2	<0.2	<0.2	<1	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<25	<25	<0.5	<0.5	<0.5	<0.5	<2.5	<0.5	<0.5	<0.5
1,2&1,4-DICHLOROBENZENE	<25	<25	<0.5	<0.5	<0.5	<0.5	<2.5	<0.5	<0.5	<0.5
DICHLORODIFLUOROMETHANE	<10	<10	<0.2	<0.2	<0.2	<0.2	<1	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	130	150	40.9	28	18	22.6	<1	35.8	16.2	13
1,2-DICHLOROETHANE	<10	<10	29	35	32	38.5	1	47.1	6.5	<0.2
1,1-DICHLOROETHENE	2470	2480	2500	2400	3100	1800	2700	3100	2900	2700
1,2-DICHLOROETHENE (TOTAL)	60	40	29.8	<0.2	<0.2	20.9	24	28.3	27.9	5.8
1,2-DICHLOROPROPANE	<10	<10	<0.2	<0.2	<0.2	<0.2	<1	<0.2	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<10	<10	<0.2	<0.2	<0.2	<0.2	<1	<0.2	<0.2	<0.2
TRANS-1,3-DICHLOROPROPENE	<10	<10	<0.2	<0.2	<0.2	<0.2	<1	<0.2	<0.2	<0.2
METHYLENE CHLORIDE	<100	<100	<2	31	4.1	<2	<10	<2	<2	<2
1,1,2,2-TETRACHLOROETHANE	<10	<10	<0.2	<0.2	<0.2	<0.2	<1	<0.2	<0.2	<0.2
TETRACHLOROETHENE	500	640	700	800	1000	500	800	900	800	760
1,1,1-TRICHLOROETHANE	5100	5200	5500	4500	5200	4100	4100	5100	7100	4700
1,1,2-TRICHLOROETHANE	<10	<10	<0.2	<0.2	<0.2	<0.2	<1	<0.2	<0.2	<0.2
TRICHLOROETHENE	20	40	40	48	35	27.2	55	70.7	42.9	62
TRICHLOROFLUOROMETHANE	<25	<25	<0.5	<0.5	<0.5	<0.5	<2.5	<0.5	<0.5	<0.5
VINYL CHLORIDE	<10	<10	<0.2	<0.2	<0.2	<0.2	<1	<0.2	<0.2	<0.2
TRICHLOROTRIFLUOROETHANE	<100	<100	<2	6.1	4.9	<2	<10	<2	<2	<2
2-CHLOROETHYL VINYL ETHER	<10	<10	<0.2	<0.2	<0.2	<0.2	<1	<0.2	<0.2	<0.2
BENZENE	.	.	.	.	.	.	.	.	.	.
TOLUENE	.	.	.	.	.	.	.	.	.	.
ETHYLBENZENE	.	.	.	.	.	.	.	.	.	.
1,2-DICHLOROBENZENE	.	.	.	.	.	.	.	.	.	.
1,4-DICHLOROBENZENE
ACETONE
O,P-XYLENE
M-XYLENE

TABLE SW-C.1
SWPL VOCS IN PPB

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WELL	DM201									
DATE	04/03/91	04/08/91	04/12/91	04/15/91	05/10/91	05/24/91	06/07/91	06/28/91	07/05/91	07/19/91
SAMPLE CODE	PT	PT	PT	PT	PT	PT	PT	PT	PT	PD
BROMODICHLOROMETHANE	<20	<40	<40	<20	<20	<20	<40	<4	<40	<40
BROMOFORM	<20	<40	<40	<20	<20	<20	<40	<4	<40	<40
BROMOMETHANE	<20	<40	<40	<20	<20	<20	<40	<4	<40	<40
CARBON TETRACHLORIDE	<20	<40	<40	<20	<20	<20	<40	<4	<40	<40
CHLOROETHANE	<20	<40	<40	<20	<20	<20	<40	<4	<40	<40
CHLOROFORM	<20	<40	<40	<20	<20	<20	<40	7	<40	<40
CHLOROMETHANE	<20	<40	<40	<20	<20	<20	<40	<4	<40	<40
DIBROMOCHLOROMETHANE	<20	<40	<40	<20	<20	<20	<40	<4	<40	<40
1,3-DICHLOROBENZENE	<50	<100	<100	<50	<50	<50	<100	<10	<100	<100
1,2&1,4-DICHLOROBENZENE	<50	<100	<100	<50	<50	<50	<100	<10	<100	<100
DICHLORODIFLUOROMETHANE	<20	<40	<40	<20	<20	<20	<40	<4	<40	<40
1,1-DICHLOROETHANE	50	<40	<40	<20	<20	<20	<40	<4	<40	<40
1,2-DICHLOROETHANE	<20	<40	<40	<20	<20	<20	<40	4	<40	<40
1,1-DICHLOROETHENE	3000	2200	3000	2300	2520	2340	3300	2300	3270	3300
1,2-DICHLOROETHENE(TOTAL)	30	<40	<40	<20	<20	<20	<40	18	<40	<40
1,2-DICHLOROPROPANE	<20	<40	<40	<20	<20	<20	<40	<4	<40	<40
CIS-1,3-DICHLOROPROPENE	<20	<40	<40	<20	<20	<20	<40	<4	<40	<40
TRANS-1,3-DICHLOROPROPENE	<20	<40	<40	<20	<20	<20	<40	<4	<40	<40
METHYLENE CHLORIDE	<200	<400	<400	<200	<200	<200	<400	<40	<400	<400
1,1,2,2-TETRACHLOROETHANE	<20	<40	<40	<20	<20	<20	<40	<4	<40	<40
TETRACHLOROETHENE	800	740	550	520	390	320	500	320	600	400
1,1,1-TRICHLOROETHANE	4500	5900	5700	5000	3410	3450	5000	3500	4700	4200
1,1,2-TRICHLOROETHANE	<20	<40	<40	<20	<20	<20	<40	<4	<40	<40
TRICHLOROETHENE	40	<40	<40	28	30	20	<40	24	<40	<40
TRICHLOROFUOROMETHANE	<50	<100	<100	<50	<50	<50	<100	<10	<100	<100
VINYL CHLORIDE	<20	<40	<40	<20	<20	<20	<40	<4	<40	<40
TRICHLOROTRIFLUOROETHANE	<200	<400	<400	<200	<200	<200	<400	<40	<400	<400
2-CHLOROETHYLVINYL ETHER	<20	<40	<40	<20	<20	<20	<40	<4	<40	<40
BENZENE	.	.	.	.	.	.	.	.	.	.
TOLUENE	.	.	.	.	.	.	.	.	.	.
ETHYLBENZENE	.	.	.	.	.	.	.	.	.	.
1,2-DICHLOROBENZENE	.	.	.	.	.	.	.	.	.	.
1,4-DICHLOROBENZENE
ACETONE
O,P-XYLENE
M-XYLENE

TABLE SW-C.1
SWPL VOCS IN PPB

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WELL	DM201									
DATE	07/19/91	08/02/91	08/16/91	08/30/91	09/13/91	09/27/91	10/11/91	10/25/91	11/08/91	11/08/91
SAMPLE CODE	PT	PT	PT	PT	PT	PT	PT	PT	PD	PT
BROMODICHLOROMETHANE	<40	<20	<40	<20	<40	<20	<40	<20	<10	<10
BROMOFORM	<40	<20	<40	<20	<40	<20	<40	<20	<10	<10
BROMOMETHANE	<40	<20	<40	<20	<40	<20	<40	<20	<10	<10
CARBON TETRACHLORIDE	<40	<20	<40	<20	<40	<20	<40	<20	<10	<10
CHLOROENZENE	<100	<50	<100	<50	<100	<50	<100	<50	<25	<25
CHLOROETHANE	<40	<20	<40	<20	<40	<20	<40	<20	<10	<10
CHLOROFORM	<40	<20	<40	<20	<40	<20	<40	<20	<10	<10
CHLOROMETHANE	<40	<20	<40	<20	<40	<20	<40	<20	<10	<10
DIBROMOCHLOROMETHANE	<40	<20	<40	<20	<40	<20	<40	<20	<10	<10
1,3-DICHLOROBENZENE	<100	<50	<100	<50	<100	<50	<100	<50	<25	<25
1,2&1,4-DICHLOROBENZENE	<100	<50	<100	<50	<100	<50	<100	<50	<25	<25
DICHLORODIFLUOROMETHANE	<40	<20	<40	<20	<40	<20	<40	<20	<10	<10
1,1-DICHLOROETHANE	<40	<20	<40	<20	<40	<20	<40	<20	<10	<10
1,2-DICHLOROETHANE	<40	<20	<40	<20	<40	<20	<40	<20	<10	<10
1,1-DICHLOROETHENE	3300	3800	3700	2400	2300	2600	2000	1300	2500	2500
1,2-DICHLOROETHENE(TOTAL)	<40	30	<40	<20	<40	<20	<40	<20	<10	<10
1,2-DICHLOROPROPANE	<40	<20	<40	<20	<40	<20	<40	<20	<10	<10
CIS-1,3-DICHLOROPROPENE	<40	<20	<40	<20	<40	<20	<40	<20	<10	<10
TRANS-1,3-DICHLOROPROPENE	<40	<20	<40	<20	<40	<20	<40	<20	<10	<10
METHYLENE CHLORIDE	<400	<200	<400	<200	<400	<400	<400	<200	<100	<100
1,1,2,2-TETRACHLOROETHANE	<40	<20	<40	<20	<40	<20	<40	<20	<10	<10
TETRACHLOROETHENE	460	500	490	350	200	580	230	250	470	450
1,1,1-TRICHLOROETHANE	4500	3900	4300	2600	2200	3200	2100	1700	2500	2500
1,1,2-TRICHLOROETHANE	<40	<20	<40	<20	<40	<20	<40	<20	<10	<10
TRICHLOROETHENE	<40	<20	<40	20	<40	40	48	<20	20	10
TRICHLOROFLUOROMETHANE	<100	<50	<100	<50	<100	<50	<100	<50	<25	<25
VINYL CHLORIDE	<40	<20	<40	<20	<40	<20	<40	<20	<10	<10
TRICHLOROTRIFLUOROETHANE	<400	<200	<400	<200	<400	<200	<400	<200	<100	<100
2-CHLOROETHYLVINYL ETHER	<40	<20	<40	<20	<40	<20	<40	<20	<10	<10
BENZENE	.	.	.	.	.	.	.	.	.	.
TOLUENE	.	.	.	.	.	.	.	.	.	.
ETHYLBENZENE	.	.	.	.	.	.	.	.	.	.
1,2-DICHLOROBENZENE	.	.	.	.	.	.	.	.	.	.
1,4-DICHLOROBENZENE
ACETONE
O,P-XYLENE
M-XYLENE

TABLE SW-C.1
SWPL VOCS IN PPB

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WELL	DM201 12/09/91	DM201-0120 02/14/91	DM201-0480 02/14/91	DM201-0840 02/15/91	DM201-1200 02/15/91	DM201-1490 02/15/91	DM201-0B1 02/12/91	DM201-0B1 03/20/91	DM201-0B1 03/29/91	DM201-0B1 04/03/91
DATE	PT	AQ	AQ	AQ	AQ	AQ	FO	FO	FO	FO
BROMODICHLOROMETHANE	<10	<5	<5	<5	<5	<5	<10	<500	<0.2	<200
BROMOFORM	<10	<5	<5	<5	<5	<5	<10	<500	<0.2	<200
BROMOMETHANE	<10	<5	<5	<5	<5	<5	<10	<500	<0.2	<200
CARBON TETRACHLORIDE	<10	<5	<5	<5	<5	<5	<10	<500	<0.2	<200
CHLOROBENZENE	<25	<12.5	<12.5	<12.5	<12.5	<12.5	<25	<1250	<0.5	<500
CHLOROETHANE	<10	<5	<5	<5	<5	<5	<10	<500	<0.2	<200
CHLOROFORM	<10	<5	<5	<5	<5	<5	<10	<500	<0.2	<200
CHLOROMETHANE	<10	<5	<5	<5	<5	<5	<10	<500	<0.2	<200
DIBROMOCHLOROMETHANE	<10	<5	<5	<5	<5	<5	<10	<500	<0.2	<200
1,3-DICHLOROBENZENE	<25	<12.5	<12.5	<12.5	<12.5	<12.5	<25	<1250	<0.5	<500
1,2&1,4-DICHLOROBENZENE	<25	<12.5	<12.5	<12.5	<12.5	<12.5	<25	<1250	<0.5	<500
DICHLORODIFLUOROMETHANE	<10	<5	<5	<5	<5	<5	<10	<500	<0.2	<200
1,1-DICHLOROETHANE	<10	30	60	50	29	54	<10	<500	<0.2	<200
1,2-DICHLOROETHANE	<10	<5	<5	<5	<5	<5	<10	<500	<0.2	<200
1,1-DICHLOROETHENE	1900	2530	2510	2340	1590	1000	23000	25000	17000	22000
1,2-DICHLOROETHENE (TOTAL)	10	30	36	29	10	25	<10	<500	<0.2	<200
1,2-DICHLOROPROPANE	<10	<5	<5	<5	<5	<5	<10	<500	<0.2	<200
CIS-1,3-DICHLOROPROPENE	<10	<5	<5	<5	<5	<5	<10	<500	<0.2	<200
TRANS-1,3-DICHLOROPROPENE	<10	<5	<5	<5	<5	<5	<10	<500	<0.2	<200
METHYLENE CHLORIDE	<100	<50	<50	<50	<50	<50	<100	<5000	<2	<2000
1,1,2,2-TETRACHLOROETHANE	<10	<5	<5	<5	<5	<5	<10	<500	<0.2	<200
TETRACHLOROETHENE	330	680	660	590	340	580	960	700	980	1100
1,1,1-TRICHLOROETHANE	1700	7810	6870	5970	2200	2200	40000	42000	37000	33000
1,1,2-TRICHLOROETHANE	<10	<5	<5	<5	<5	<5	<10	<500	<0.2	<200
TRICHLOROETHENE	20	30	28	28	15	25	30	<500	48	<200
TRICHLOROFLUOROMETHANE	<25	<12.5	<12.5	<12.5	<12.5	<12.5	<25	<1250	<0.5	<500
VINYL CHLORIDE	<10	<5	<5	<5	<5	<5	<10	<500	<0.2	<200
TRICHLOROTRIFLUOROETHANE	<100	<50	<50	330	<50	<50	<100	<5000	<2	<2000
2-CHLOROETHYL VINYL ETHER	<10	<5	<5	<5	<5	<5	<10	<500	<0.2	<200
BENZENE	.	.	.	.	.	.	.	.	.	.
TOLUENE	.	.	.	.	.	.	.	.	.	.
ETHYLBENZENE	.	.	.	.	.	.	.	.	.	.
1,2-DICHLOROBENZENE	.	.	.	.	.	.	.	.	.	.
1,4-DICHLOROBENZENE
ACETONE
O,P-XYLENE
M-XYLENE

TABLE SW-C.1
SWPL VOCS IN PPB

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WELL	DM201-0B1									
DATE	04/12/91	06/28/91	07/05/91	07/19/91	07/19/91	08/02/91	08/16/91	08/30/91	09/13/91	09/27/91
SAMPLE CODE	FO	FO	PT	PD	PT	PT	PT	PT	PT	PT
BROMODICHLOROMETHANE	<200	<100	<200	<100	<100	<50	<200	<100	<100	<100
BROMOFORM	<200	<100	<200	<100	<100	<50	<200	<100	<100	<100
BROMOMETHANE	<200	<100	<200	<100	<100	<50	<200	<100	<100	<100
CARBON TETRACHLORIDE	<200	<100	<200	<100	<100	<50	<200	<100	<100	<100
CHLOROETHANE	<200	<100	<200	<100	<100	<50	<200	<100	<100	<100
CHLOROFORM	<200	<100	<200	<100	<100	<50	<200	<100	<100	<100
CHLOROMETHANE	<200	<100	<200	<100	<100	<50	<200	<100	<100	<100
DIBROMOCHLOROMETHANE	<200	<100	<200	<100	<100	<50	<200	<100	<100	<100
1,3-DICHLOROBENZENE	<500	<250	<500	<250	<250	<125	<500	<250	<250	<250
1,2&1,4-DICHLOROBENZENE	<500	<250	<500	<250	<250	<125	<500	<250	<250	<250
DICHLORODIFLUOROMETHANE	<200	<100	<200	<100	<100	<50	<200	<100	<100	<100
1,1-DICHLOROETHANE	<200	<100	300	<100	<100	440	<200	<100	<100	<100
1,2-DICHLOROETHANE	<200	<100	<200	120	110	<50	<200	<100	<100	<100
1,1-DICHLOROETHENE	24000	26600	25000	22000	24000	30000	22300	18600	20000	24000
1,2-DICHLOROETHENE(TOTAL)	<200	<100	<200	<100	<100	<50	<200	<100	<100	<100
1,2-DICHLOROPROPANE	<200	<100	<200	<100	<100	<50	<200	<100	<100	<100
CIS-1,3-DICHLOROPROPENE	<200	<100	<200	<100	<100	<50	<200	<100	<100	<100
TRANS-1,3-DICHLOROPROPENE	<200	<100	<200	<100	<100	<50	<200	<100	<100	<100
METHYLENE CHLORIDE	<2000	<1000	<2000	<1000	<1000	<500	<2000	<1000	<1000	<1000
1,1,2,2-TETRACHLOROETHANE	<200	<100	<200	<100	<100	<50	<200	<100	<100	<100
TETRACHLOROETHENE	840	1200	1100	1000	1100	1260	800	1100	370	1700
1,1,1-TRICHLOROETHANE	42000	28700	30000	22000	25000	29800	26900	20100	27000	34000
1,1,2-TRICHLOROETHANE	<200	<100	<200	<100	<100	<50	<200	<100	<100	<100
TRICHLOROETHENE	<200	<100	<200	<100	<100	<50	<200	<100	<100	<100
TRICHLOROFLUOROMETHANE	<500	<250	<500	<250	<250	<125	<500	<250	<250	<250
VINYL CHLORIDE	<200	<100	<200	<100	<100	<50	<200	<100	<100	<100
TRICHLOROTRIFLUOROETHANE	<2000	<1000	<2000	<1000	<1000	<500	<2000	<1000	<1000	<1000
2-CHLOROETHYLVINYL ETHER	<200	<100	<200	<100	<100	<50	<200	<100	<100	<100
BENZENE	.	.	.	.	.	.	.	.	.	.
TOLUENE	.	.	.	.	.	.	.	.	.	.
ETHYLBENZENE	.	.	.	.	.	.	.	.	.	.
1,2-DICHLOROBENZENE	.	.	.	.	.	.	.	.	.	.
1,4-DICHLOROBENZENE
ACETONE
O,P-XYLENE
M-XYLENE

TABLE SW-C.1
SWPL VOCS IN PPB

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WELL	DM201-0B1	DM201-0B1	DM201-0B1	DM201-0B1	DM201-0B1	DM201-0B2	DM201-0B2	DM201-0B2	DM201-0B2	DM201-0B2
DATE	10/11/91	10/25/91	11/08/91	11/08/91	12/09/91	02/12/91	03/20/91	03/29/91	04/03/91	04/12/91
SAMPLE CODE	PT	PT	PD	PT	PT	FO	FO	FO	FO	FO
BROMODICHLOROMETHANE	<100	<100	<100	<100	<40	<10	<0.2	<0.2	<40	<40
BROMOFORM	<100	<100	<100	<100	<40	<10	<0.2	<0.2	<40	<40
BROMOMETHANE	<100	<100	<100	<100	<40	<10	<0.2	<0.2	<40	<40
CARBON TETRACHLORIDE	<100	<100	<100	<100	<40	<10	<0.2	<0.2	<40	<40
CHLOROBENZENE	<250	<250	<250	<250	<100	<25	<0.5	<0.5	<100	<100
CHLOROETHANE	<100	<100	<100	<100	<40	<10	<0.2	<0.2	<40	<40
CHLOROFORM	<100	<100	<100	<100	<40	<10	4.6	3	<40	<40
CHLOROMETHANE	<100	<100	<100	<100	<40	<10	<0.2	<0.2	<40	<40
DIBROMOCHLOROMETHANE	<100	<100	<100	<100	<40	<10	<0.2	<0.2	<40	<40
1,3-DICHLOROBENZENE	<250	<250	<250	<250	<100	<25	<0.5	<0.5	<100	<100
1,2&1,4-DICHLOROBENZENE	<250	<250	<250	<250	<100	<25	<0.5	<0.5	<100	<100
DICHLORODIFLUOROMETHANE	<100	<100	<100	<100	<40	<10	<0.2	<0.2	<40	<40
1,1-DICHLOROETHANE	<100	<100	<100	<100	<40	<10	11.5	2.9	<40	<40
1,2-DICHLOROETHANE	<100	<100	<100	<100	140	<10	48.9	<0.2	<40	<40
1,1-DICHLOROETHENE	18000	17000	19000	18000	21000	3200	5300	3800	4800	4300
1,2-DICHLOROETHENE (TOTAL)	<100	<100	<100	<100	<40	30	42.8	<0.2	<40	<40
1,2-DICHLOROPROPANE	<100	<100	<100	<100	<40	<10	<0.2	<0.2	<40	<40
CIS-1,3-DICHLOROPROPENE	<100	<100	<100	<100	<40	<10	<0.2	<0.2	<40	<40
TRANS-1,3-DICHLOROPROPENE	<100	<100	<100	<100	<40	<10	<0.2	<0.2	<40	<40
METHYLENE CHLORIDE	<1000	<1000	<1000	<1000	<400	<100	<2	<2	<400	<400
1,1,2,2-TETRACHLOROETHANE	<100	<100	<100	<100	<40	<10	<0.2	<0.2	<40	<40
TETRACHLOROETHENE	810	800	800	810	1100	790	500	580	650	450
1,1,1-TRICHLOROETHANE	21000	24000	22000	22000	23000	5400	8500	5900	7100	6900
1,1,2-TRICHLOROETHANE	<100	<100	<100	<100	<40	<10	<0.2	<0.2	<40	<40
TRICHLOROETHENE	<100	<100	<100	<100	40	80	80	95	50	43
TRICHLOROFLUOROMETHANE	<250	<250	<250	<250	<100	<25	<0.5	<0.5	<100	<100
VINYL CHLORIDE	<100	<100	<100	<100	<40	<10	<0.2	<0.2	<40	<40
TRICHLOROTRIFLUOROETHANE	<1000	<1000	<1000	<1000	<400	<100	<2	<2	<400	<400
2-CHLOROETHYL VINYL ETHER	<100	<100	<100	<100	<40	<10	<0.2	<0.2	<40	<40
BENZENE	.	.	.	.	.	.	.	.	.	.
TOLUENE	.	.	.	.	.	.	.	.	.	.
ETHYLBENZENE	.	.	.	.	.	.	.	.	.	.
1,2-DICHLOROBENZENE	.	.	.	.	.	.	.	.	.	.
1,4-DICHLOROBENZENE
ACETONE
O,P-XYLENE
M-XYLENE

TABLE SW-C.1
SWPL VOCS IN PPB

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WELL	DM201-0B3	DM201-0B3	DM201-0B3	DM201-0B3	DM201-0B3	DM503	DM503	DM503	DM503	DM503
DATE	02/11/91	03/20/91	03/29/91	04/03/91	04/12/91	01/02/91	01/08/91	01/17/91	06/17/91	06/28/91
SAMPLE CODE	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO
BROMODICHLOROMETHANE	<0.2	<0.2	<1	<1	<1	0.6	<0.2	<0.2	<0.2	<0.2
BROMOFORM	<0.2	<0.2	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2
BROMOMETHANE	<0.2	<0.2	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<0.2	<0.2	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROBENZENE	<0.5	<0.5	<2.5	<2.5	<2.5	3.7	0.9	<0.5	<0.5	<0.5
CHLOROETHANE	<0.2	<0.2	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROFORM	0.3	0.7	1.2	1	<1	2.8	2.2	1.9	1	1.6
CHLOROMETHANE	<0.2	<0.2	<1	<1	<1	<0.2	<0.2	63.7	<0.2	<0.2
DIBROMOCHLOROMETHANE	<0.2	<0.2	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<0.5	<0.5	<2.5	<2.5	<2.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2&1,4-DICHLOROBENZENE	<0.5	<0.5	<2.5	<2.5	<2.5	9.5	3.6	<0.5	<0.5	<0.5
DICHLORODIFLUOROMETHANE	<0.2	<0.2	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	0.6	<0.2	<1	2	<1	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROETHANE	0.3	0.6	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHENE	2	9.4	115	98	3.4	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (TOTAL)	3.4	6.9	<1	8	<1	1.4	3.2	0.2	<0.2	<0.2
1,2-DICHLOROPROPANE	<0.2	<0.2	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2
METHYLENE CHLORIDE	<2	<2	<10	<10	<10	<2	<2	<2	<2	<2
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2
TETRACHLOROETHENE	15.6	37	43	39	20	3.5	1.8	0.6	<0.2	<0.2
1,1,1-TRICHLOROETHANE	0.2	11.4	170	191	10	1.4	<0.2	<0.2	<0.2	<0.2
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2
TRICHLOROETHENE	36.8	84	72	69	58	17.1	15.8	1.2	0.3	0.2
TRICHLOROFLUOROMETHANE	<0.5	<0.5	<2.5	<2.5	<2.5	<0.5	<0.5	<0.5	<0.5	<0.5
VINYL CHLORIDE	<0.2	<0.2	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2
TRICHLOROTRIFLUOROETHANE	<2	<2	<10	<10	<10	<2	<2	<2	<2	<2
2-CHLOROETHYLVINYL ETHER	<0.2	<0.2	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2
BENZENE	.	.	.	.	.	.	.	.	.	.
TOLUENE	.	.	.	.	.	.	.	.	.	.
ETHYLBENZENE	.	.	.	.	.	.	.	.	.	.
1,2-DICHLOROBENZENE	.	.	.	.	.	.	.	.	.	.
1,4-DICHLOROBENZENE	.	.	.	.	.	.	.	.	.	.
ACETONE	.	.	.	.	.	.	.	.	.	.
O,P-XYLENE	.	.	.	.	.	.	.	.	.	.
M-XYLENE	.	.	.	.	.	.	.	.	.	.

TABLE SW-C.1
SWPL VOCS IN PPB

WELL DATE	DM701 12/19/91	DM701 12/19/91	DM701-GE 11/07/91	DM701-GE 11/07/91	DM701-GE 12/05/91	DM701-STA 11/07/91	DM701-STA 11/07/91	DM701-GE 12/05/91	DM701-STA 11/07/91	DM701-STA 12/05/91	DM701-STA 12/05/91
SAMPLE CODE	FD	FO	FD	FO	FD	FD	FO	FD	FO	FD	FO
BROMODICHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BROMOFORM	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BROMOMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CARBON TETRACHLORIDE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
CHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROFORM	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
DIBROMOCHLOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,3-DICHLOROBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2&1,4-DICHLOROBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
DICHLORODIFLUOROMETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-DICHLOROETHENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-DICHLOROPROPANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
METHYLENE CHLORIDE	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TETRACHLOROETHENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,1-TRICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TRICHLOROETHENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TRICHLOROFLUOROMETHANE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
VINYL CHLORIDE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TRICHLOROTRIFLUOROETHANE	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
2-CHLOROETHYL VINYL ETHER	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BENZENE	.	.	.	.	.	.	.	.	.	.	.
TOLUENE	.	.	.	.	.	.	.	.	.	.	.
ETHYLBENZENE	.	.	.	.	.	.	.	.	.	.	.
1,2-DICHLOROBENZENE	.	.	.	.	.	.	.	.	.	.	.
1,4-DICHLOROBENZENE
ACETONE
O,P-XYLENE
M-XYLENE

TABLE SW-C.1
SWPL VOCS IN PPB

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WELL	MP16-A									
DATE	08/29/85	10/11/85	11/15/85	01/29/86	03/20/86	06/12/86	05/20/87	11/18/87	09/19/88	01/17/89
SAMPLE CODE	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO
BROMODICHLOROMETHANE	<0.5	<1	<1	<0.5	<0.5	<1	<0.5	<1	<1	<1
BROMOFORM	<0.5	<2	<2	<0.5	<1	<2	<1	<2	<2	<2
BROMOMETHANE	<2	<12	<12	<2	<10	<12	<1	<11.8	<11.8	<11.8
CARBON TETRACHLORIDE	<0.5	<2	<2	<0.5	<1	<2	<1	<1.2	<1.2	<1.2
CHLORO BENZENE	<0.5	<3	<3	<0.5	<2	<3	<2	<2.5	<2.5	<2.5
CHLOROETHANE	<1	<6	<6	<1	<5	<6	<1	<5.2	<5.2	<5.2
CHLOROFORM	1.6	2.3	12.2	4.2	<0.5	1.1	<0.5	<0.5	<0.5	<0.5
CHLOROMETHANE	<0.1	<0.5	<0.5	<0.1	<0.5	<1	<0.5	<0.8	<0.8	<0.8
DIBROMOCHLOROMETHANE	<0.1	<1	<1	<0.1	<0.5	<1	<1	<0.9	<0.9	<0.9
1,3-DICHLOROBENZENE	.	.	.	.	.	.	.	.	.	.
1,2&1,4-DICHLOROBENZENE	.	.	.	.	.	.	.	.	.	.
DICHLORODIFLUOROMETHANE	<2	<20	<20	<2	<10	<20	<0.5	<18.1	<18.1	<18.1
1,1-DICHLOROETHANE	0.08	3.2	12.6	2.6	<0.5	<1	<0.5	<0.7	<0.7	<0.7
1,2-DICHLOROETHANE	1.2	<0.5	<0.5	<0.05	<0.5	<0.5	<1	<0.3	<0.3	<0.3
1,1-DICHLOROETHENE	2.2	10.9	33.3	7.3	4.6	3.5	<1	3.6	<1.3	<1.3
1,2-DICHLOROETHENE (TOTAL)	0.71	2.2	18.7	0.26	<0.5	<1	<1	<1	<1	<1
1,2-DICHLOROPROPANE	<0.05	<0.5	<0.5	<0.05	<0.5	<0.5	<0.5	<0.4	<0.4	<0.4
CIS-1,3-DICHLOROPROPENE	<0.5	<2	<2	<0.5	<1	<2	<1	<2	<2	<2
TRANS-1,3-DICHLOROPROPENE	<0.5	<4	<4	<0.5	<2	<4	<2	<3.4	<3.4	<3.4
METHYLENE CHLORIDE	<0.5	<3	<3	<0.5	<2	<3	<0.5	<2.5	<2.5	<2.5
1,1,2,2-TETRACHLOROETHANE	<0.05	<0.5	<0.5	<0.05	<0.5	<0.5	<0.5	<0.3	<0.3	<0.3
TETRACHLOROETHENE	25.7	69.5	130	50.8	49.1	75.4	23.5	54.5	78	240
1,1,1-TRICHLOROETHANE	4.9	41.1	100	11	8.9	15.3	<0.5	1	<0.3	<0.3
1,1,2-TRICHLOROETHANE	<0.05	<0.5	<0.5	<0.05	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2
TRICHLOROETHENE	14.9	129	70.9	29.7	35.9	69.9	26.3	21.4	32	25.99
TRICHLOROFLUOROMETHANE	<1	<5	<5	<1	<5	<5	<1	<10	<10	<10
VINYL CHLORIDE	<0.5	<2	<2	<0.5	<1	<2	<0.5	<1.8	<1.8	<1.8
TRICHLOROTRIFLUOROETHANE	<1	3.3	18.8	<1	<5	12	<0.5	<20	<10	<10
2-CHLOROETHYL VINYL ETHER	<0.5	<2	<2	<0.5	<1	<2	<0.5	<1.3	<1.3	<1.3
BENZENE	.	.	.	.	.	.	<2	.	.	.
TOLUENE	.	.	.	.	.	.	<4	.	.	.
ETHYLBENZENE	.	.	.	.	.	.	<1	.	.	.
1,2-DICHLOROBENZENE	.	.	.	.	.	.	<4	<1.5	<1.5	<1.5
1,4-DICHLOROBENZENE	<6	<2.4	<2.4	<2.4
ACETONE	<500	.	.	.
O,P-XYLENE	<2	.	.	.
M-XYLENE	<2	.	.	.

TABLE SW-C.1
SWPL VOCS IN PPB

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WELL	MP16-A	MP16-A	MP16-A	MP16-A	MP16-A	MP16-A	MP16-B	MP16-B	MP16-B	MP16-B
DATE	11/29/89	11/02/90	01/18/91	02/11/91	04/15/91	07/03/91	08/27/85	10/08/85	11/13/85	01/27/86
SAMPLE CODE	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO
BROMODICHLOROMETHANE	<0.2	0.3	<1	.	0.4	<0.2	<0.5	<0.5	<0.5	<0.5
BROMOFORM	<0.2	<0.2	<1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
BROMOMETHANE	<0.2	<0.2	<1	<0.2	<0.2	<0.2	<2	<2	<2	<2
CARBON TETRACHLORIDE	<0.2	<0.2	<1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
CHLOROBENZENE	<0.5	<0.5	<2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
CHLOROETHANE	<0.2	<0.2	<1	<0.2	<0.2	<0.2	<1	<1	<1	<1
CHLOROFORM	0.5	1.2	2	1	1.4	0.6	<0.1	1.6	1	0.79
CHLOROMETHANE	<0.2	<0.2	30	<0.2	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1
DIBROMOCHLOROMETHANE	<0.2	<0.2	<1	<0.2	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1
1,3-DICHLOROBENZENE	<0.5	<0.5	<2.5	<0.5	<0.5	<0.5	.	.	.	.
1,2&1,4-DICHLOROBENZENE	<0.5	<0.5	<2.5	<0.5	<0.5	<0.5	.	.	.	.
DICHLORODIFLUOROMETHANE	<0.2	<0.2	<1	<0.2	<0.2	<0.2	<2	<2	<2	<2
1,1-DICHLOROETHANE	<0.2	0.5	<1	0.7	<0.2	1	0.64	1.4	1.5	<0.1
1,2-DICHLOROETHANE	<0.2	0.3	<1	0.4	0.4	<0.2	<0.05	<0.05	<0.05	<0.05
1,1-DICHLOROETHENE	3.2	6.8	58	26	34	8.7	0.96	2.1	2.5	<0.5
1,2-DICHLOROETHENE(TOTAL)	1.4	1.6	3	2	<0.2	1.5	1.1	1.8	1.9	<0.5
1,2-DICHLOROPROPANE	<0.2	<0.2	<1	<0.2	<0.2	<0.2	<0.05	<0.05	0.12	<0.05
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
METHYLENE CHLORIDE	<2	<2	<10	<2	<2	<2	<0.5	<0.5	<0.5	<0.5
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<1	<0.2	<0.2	<0.2	<0.05	<0.05	<0.05	<0.05
TETRACHLOROETHENE	19.2	25.2	49	35.6	36	16.9	1.2	2.3	4.1	3.1
1,1,1-TRICHLOROETHANE	<0.2	4.8	80	25	25	3	0.25	3.6	11.8	2.2
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<1	<0.2	<0.2	<0.2	<0.05	<0.05	<0.05	<0.05
TRICHLOROETHENE	12.1	46.8	15	30.5	14	13.1	2.1	5.5	49.4	5.8
TRICHLOROFLUOROMETHANE	<0.5	<0.5	<2.5	<0.5	<0.5	<0.5	<1	<1	<1	<1
VINYL CHLORIDE	<0.2	<0.2	<1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
TRICHLOROTRIFLUOROETHANE	0.4	<2	<10	<2	<2	<2	0.93	2.1	5	<1
2-CHLOROETHYLVINYL ETHER	<0.2	<0.2	<1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5
BENZENE	.	.	.	.	.	.	.	.	.	.
TOLUENE	.	.	.	.	.	.	.	.	.	.
ETHYLBENZENE	.	.	.	.	.	.	.	.	.	.
1,2-DICHLOROBENZENE	.	.	.	.	.	.	.	.	.	.
1,4-DICHLOROBENZENE
ACETONE
O,P-XYLENE
M-XYLENE

TABLE SW-C.1
SWPL VOCS IN PPB

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WELL	MP16-B 01/27/86	MP16-B 03/20/86	MP16-B 06/12/86	MP16-B 08/29/86	MP16-B 02/11/91	MP16-B 04/15/91	MP16-C 09/03/85	MP16-C 10/11/85	MP16-C 11/15/85	MP16-C 01/29/86
DATE	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO
SAMPLE CODE	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO
BROMODICHLOROMETHANE	<0.5	<0.5	<0.1	<0.1	<0.2	<0.2	<1	<0.5	<1	<0.5
BROMOFORM	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<2	<0.5	<2	<0.5
BROMOMETHANE	<2	<2	<2	<2	<0.2	<0.2	<12	<2	<12	<2
CARBON TETRACHLORIDE	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<2	<0.5	<2	<0.5
CHLOROBENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<3	<0.5	<3	<0.5
CHLOROETHANE	<1	<1	<1	<1	<0.2	<0.2	<6	<1	<6	<1
CHLOROFORM	1.1	<0.1	<0.05	<0.05	<0.2	<0.2	<1	<0.1	12.2	<0.1
CHLOROMETHANE	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.5	<0.1	<0.5	<0.1
DIBROMOCHLOROMETHANE	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<1	<0.1	<1	<0.1
1,3-DICHLOROBENZENE	.	.	.	.	<0.5	<0.5	.	.	.	.
1,2&1,4-DICHLOROBENZENE	.	.	.	.	0.7	<0.5	.	.	.	.
DICHLORODIFLUOROMETHANE	<2	<2	<2	<2	<0.2	<0.2	<20	<2	<20	<2
1,1-DICHLOROETHANE	<0.1	<0.1	<0.1	<0.1	0.5	<0.2	1	3.3	12.6	2
1,2-DICHLOROETHANE	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.5	<0.05	<0.5	<0.05
1,1-DICHLOROETHENE	<0.5	<0.5	1.8	2.1	0.8	<0.2	4.7	3.4	21.6	2
1,2-DICHLOROETHENE(TOTAL)	<0.5	<0.5	2	<0.1	1	<0.2	<1	0.9	18.7	0.21
1,2-DICHLOROPROPANE	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.5	<0.05	<0.5	<0.05
CIS-1,3-DICHLOROPROPENE	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<2	<0.5	<2	<0.5
TRANS-1,3-DICHLOROPROPENE	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<4	<0.5	<4	<0.5
METHYLENE CHLORIDE	<0.5	<0.5	<0.5	<0.5	<2	<2	<3	<0.5	<3	<0.5
1,1,2,2-TETRACHLOROETHANE	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.5	<0.05	<0.5	<0.05
TETRACHLOROETHENE	2.7	<0.05	3.7	2.6	3.9	1.8	6.5	5.7	24.7	8.5
1,1,1-TRICHLOROETHANE	2	3.9	2.3	<0.05	0.5	<0.2	12.7	29.3	81.2	7.9
1,1,2-TRICHLOROETHANE	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.5	<0.05	<0.5	<0.05
TRICHLOROETHENE	3.6	4.3	7.6	6.3	15.2	2.5	15.9	64.3	33.1	9.2
TRICHLOROFLUOROMETHANE	<1	<1	<0.5	<0.5	<0.5	<0.5	<5	<1	<5	<1
VINYL CHLORIDE	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<2	<0.5	<2	<0.5
TRICHLOROTRIFLUOROETHANE	<1	<1	4.6	<0.5	<2	<2	9.1	3.6	22.9	<1
2-CHLOROETHYLVINYL ETHER	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<2	<0.5	<2	<0.5
BENZENE	.	.	.	.	.	.	.	.	.	.
TOLUENE	.	.	.	.	.	.	.	.	.	.
ETHYLBENZENE	.	.	.	.	.	.	.	.	.	.
1,2-DICHLOROBENZENE	.	.	.	.	.	.	.	.	.	.
1,4-DICHLOROBENZENE
ACETONE
O,P-XYLENE
M-XYLENE

TABLE SW-C.1
SWPL VOCS IN PPB

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WELL	MP16-C	MP16-C	MP16-D	MP20-A						
DATE	11/02/90	01/18/91	08/27/85	10/08/85	10/08/85	11/13/85	12/12/85	03/20/86	06/13/86	08/28/85
SAMPLE CODE	FO	FO	FO	FD	FO	FO	FO	FO	FO	FD
BROMODICHLOROMETHANE	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.1	<0.5
BROMOFORM	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	<0.5
BROMOMETHANE	<0.2	<0.2	<2	<2	<2	<2	<12	<2	<2	<2
CARBON TETRACHLORIDE	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	<0.5
CHLORO BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<3	<0.5	<0.5	<0.5
CHLOROETHANE	<0.2	<0.2	<1	<1	<1	<1	<6	<1	<1	<1
CHLOROFORM	<0.2	<0.2	<0.1	1.6	1.6	0.54	<1	<0.1	<0.05	5.5
CHLOROMETHANE	<0.2	50.8	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1
DIBROMOCHLOROMETHANE	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1
1,3-DICHLOROBENZENE	<0.5	<0.5	.	.	.	.	.	.	.	.
1,2&1,4-DICHLOROBENZENE	<0.5	<0.5	.	.	.	.	.	.	.	.
DICHLORODIFLUOROMETHANE	<0.2	<0.2	<2	<2	<2	<2	<20	<2	<2	<2
1,1-DICHLOROETHANE	<0.2	<0.2	0.95	<0.1	<0.1	1	8.5	<0.1	0.9	<0.1
1,2-DICHLOROETHANE	<0.2	<0.2	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05
1,1-DICHLOROETHENE	<0.2	<0.2	1.3	<0.5	<0.5	1.7	14.6	<0.5	<0.5	0.25
1,2-DICHLOROETHENE (TOTAL)	0.3	<0.2	0.89	1.4	1.4	1.2	11.8	<0.5	0.8	<0.5
1,2-DICHLOROPROPANE	<0.2	<0.2	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	<0.5
TRANS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<4	<0.5	<0.5	<0.5
METHYLENE CHLORIDE	<2	<2	<0.5	<0.5	<0.5	<0.5	<3	<0.5	<0.5	<0.5
1,1,2,2-TETRACHLOROETHANE	<0.2	<0.2	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05
TETRACHLOROETHENE	1.4	0.7	0.86	1.3	1.4	4.5	19.9	<0.05	3	0.09
1,1,1-TRICHLOROETHANE	<0.2	<0.2	0.48	4.1	5.2	28.5	84	0.26	1.6	2.6
1,1,2-TRICHLOROETHANE	<0.2	<0.2	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05
TRICHLOROETHENE	1.8	1	3.2	3.6	6.8	75.9	683	0.41	5.9	9.1
TRICHLOROFLUOROMETHANE	<0.5	<0.5	<1	<1	<1	<1	<5	<1	<0.5	<1
VINYL CHLORIDE	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	<0.5
TRICHLOROTRIFLUOROETHANE	<2	<2	1.8	1.9	2.1	5.4	19.9	<1	3.7	<1
2-CHLOROETHYL VINYL ETHER	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	<0.5
BENZENE	.	.	.	.	.	.	.	.	.	.
TOLUENE	.	.	.	.	.	.	.	.	.	.
ETHYLBENZENE	.	.	.	.	.	.	.	.	.	.
1,2-DICHLOROBENZENE	.	.	.	.	.	.	.	.	.	.
1,4-DICHLOROBENZENE
ACETONE
O,P-XYLENE
M-XYLENE

TABLE SW-C.1
SWPL VOCS IN PPB

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WELL	MP20-A	MP20-B	MP20-B							
DATE	08/28/85	10/04/85	11/08/85	12/09/85	03/17/86	06/10/86	11/06/90	01/23/91	08/29/85	10/07/85
SAMPLE CODE	FO	FO	FO	FO	FO	FO	FO	FO	FO	FD
BROMODICHLOROMETHANE	<0.5	<0.5	<1	<1	<1	<0.1	<0.2	<0.2	<0.5	<1
BROMOFORM	<0.5	<0.5	<2	<2	<2	<0.5	<0.2	<0.2	<0.5	<2
BROMOMETHANE	<2	<2	<12	<12	<12	<2	<0.2	<0.2	<2	<12
CARBON TETRACHLORIDE	<0.5	<0.5	<2	<2	<2	<0.5	<0.2	<0.2	<0.5	<2
CHLORO BENZENE	<0.5	<0.5	<3	<3	<3	<0.5	<0.5	<0.5	0.31	<3
CHLOROETHANE	<1	<1	<6	<6	<6	<1	<0.2	<0.2	<1	<6
CHLOROFORM	5.1	4.6	1.9	14.8	<1	<0.05	<0.2	<0.2	0.09	<1
CHLOROMETHANE	<0.1	<0.1	<0.5	<0.5	<0.5	<0.1	<0.2	<0.2	<0.1	<0.5
DIBROMOCHLOROMETHANE	<0.1	<0.1	<1	<1	<1	<0.1	<0.2	<0.2	<0.1	<1
1,3-DICHLOROBENZENE	.	.	.	.	.	.	<0.5	<0.5	.	.
1,2&1,4-DICHLOROBENZENE	.	.	.	.	.	.	<0.5	<0.5	.	.
DICHLORODIFLUOROMETHANE	<2	<2	<20	<20	<20	<2	<0.2	<0.2	<2	<20
1,1-DICHLOROETHANE	<0.1	<0.1	<1	<1	3.7	<0.1	<0.2	<0.2	0.09	<1
1,2-DICHLOROETHANE	<0.05	<0.05	<0.5	<0.5	<0.5	<0.05	<0.2	<0.2	0.48	<0.5
1,1-DICHLOROETHENE	<0.5	2	<2	16.6	<2	<0.5	<0.2	<0.2	0.2	1.5
1,2-DICHLOROETHENE(TOTAL)	<0.5	<0.5	8.5	<1	6.2	<0.1	<0.2	<0.2	0.25	<1
1,2-DICHLOROPROPANE	<0.05	<0.05	<0.5	<0.5	<0.5	<0.05	<0.2	<0.2	<0.05	<0.5
CIS-1,3-DICHLOROPROPENE	<0.5	<0.5	<2	<2	<2	<0.5	<0.2	<0.2	<0.5	<2
TRANS-1,3-DICHLOROPROPENE	<0.5	<0.5	<4	<4	<4	<0.5	<0.2	<0.2	<0.5	<4
METHYLENE CHLORIDE	<0.5	<0.5	<3	<3	<3	<0.5	<2	<2	<0.5	<3
1,1,2,2-TETRACHLOROETHANE	<0.05	<0.05	<0.5	<0.5	<0.5	<0.05	<0.2	<0.2	<0.05	<0.5
TETRACHLOROETHENE	<0.05	4.3	7.4	24.6	<0.5	<0.05	1.2	0.99	0.58	2.1
1,1,1-TRICHLOROETHANE	3	310	80.8	42.3	19.7	11.8	1.6	<0.2	0.69	69.4
1,1,2-TRICHLOROETHANE	<0.05	<0.05	<0.5	<0.5	<0.5	<0.05	<0.2	<0.2	4.1	<0.5
TRICHLOROETHENE	6.7	400	478	23.8	2.7	0.21	<0.2	0.36	1.1	320
TRICHLOROFLUOROMETHANE	<1	<1	<5	<5	<5	<0.5	<0.5	<0.5	<1	<5
VINYL CHLORIDE	<0.5	<0.5	<2	<2	<2	<0.5	<0.2	<0.2	<0.5	<2
TRICHLOROTRIFLUOROETHANE	0.8	8.3	31.7	24.4	<5	10	<2	<0.2	<1	5.1
2-CHLOROETHYL VINYL ETHER	<0.5	<0.5	<2	<2	<2	<0.5	<0.2	<0.2	<0.5	<2
BENZENE	.	.	.	.	.	.	.	.	.	.
TOLUENE	.	.	.	.	.	.	.	.	.	.
ETHYLBENZENE	.	.	.	.	.	.	.	.	.	.
1,2-DICHLOROBENZENE	.	.	.	.	.	.	.	.	.	.
1,4-DICHLOROBENZENE
ACETONE
O,P-XYLENE
M-XYLENE

TABLE SW-C.1
SWPL VOCS IN PPB

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WELL	MP20-B 10/07/85	MP20-B 11/12/85	MP20-B 11/12/85	MP20-B 12/10/85	MP20-B 03/17/86	MP20-B 06/10/86	MP20-B 11/06/90	MP20-B 01/23/91	MP20-C 08/28/85	MP20-C 10/04/85
DATE	FO	FD	FO	FO	FO	FO	FO	FO	FO	FD
SAMPLE CODE	FO	FD	FO	FO	FO	FO	FO	FO	FO	FD
BROMODICHLOROMETHANE	<1	<0.5	<0.5	<1	<0.5	<0.1	<0.2	<0.2	<0.5	<0.5
BROMOFORM	<2	<0.5	<0.5	<2	<0.5	<0.5	<0.2	<0.2	<0.5	<0.5
BROMOMETHANE	<12	<2	<2	<12	<2	<2	<0.2	<0.2	<2	<2
CARBON TETRACHLORIDE	<2	<0.5	<0.5	<2	<0.5	<0.5	<0.2	<0.2	<0.5	<0.5
CHLOROBENZENE	<3	<0.5	<0.5	<3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
CHLOROETHANE	<6	<1	<1	<6	<1	<1	<0.2	<0.2	<1	<1
CHLOROFORM	<1	<0.1	<0.1	<1	<0.1	<0.05	<0.2	<0.2	0.4	1.5
CHLOROMETHANE	<0.5	<0.1	<0.1	<0.5	<0.1	<0.1	<0.2	<0.2	<0.1	<0.1
DIBROMOCHLOROMETHANE	<1	<0.1	<0.1	<1	<0.1	<0.1	<0.2	<0.2	<0.1	<0.1
1,3-DICHLOROBENZENE	.	.	.	.	.	.	<0.5	<0.5	.	.
1,2&1,4-DICHLOROBENZENE	.	.	.	.	.	.	<0.5	<0.5	.	.
DICHLORODIFLUOROMETHANE	<20	<2	<2	<20	<2	<2	<0.2	<0.2	<2	<2
1,1-DICHLOROETHANE	<1	<0.1	<0.1	<1	<0.1	<0.1	<0.2	<0.2	<0.1	<0.1
1,2-DICHLOROETHANE	<0.5	<0.05	<0.05	<0.5	<0.05	<0.05	<0.2	<0.2	<0.05	<0.05
1,1-DICHLOROETHENE	2.1	<0.5	<0.5	1.7	<0.5	<0.5	<0.2	<0.2	1.3	1.5
1,2-DICHLOROETHENE (TOTAL)	<1	<0.5	<0.5	1.6	<0.5	<0.1	<0.2	0.24	1.1	1.9
1,2-DICHLOROPROPANE	<0.5	<0.05	<0.05	<0.5	<0.05	<0.05	<0.2	<0.2	<0.05	<0.05
CIS-1,3-DICHLOROPROPENE	<2	<0.5	<0.5	<2	<0.5	<0.5	<0.2	<0.2	<0.5	<0.5
TRANS-1,3-DICHLOROPROPENE	<4	<0.5	<0.5	<4	<0.5	<0.5	<0.2	<0.2	<0.5	<0.5
METHYLENE CHLORIDE	<3	<0.5	<0.5	<3	<0.5	<0.5	<2	<2	<0.5	<0.5
1,1,2,2-TETRACHLOROETHANE	<0.5	<0.05	<0.05	<0.5	<0.05	<0.05	<0.2	<0.2	<0.05	<0.05
TETRACHLOROETHENE	3.9	1.7	1.8	3.5	<0.05	<0.05	<0.2	<0.2	0.28	3
1,1,1-TRICHLOROETHANE	72.3	3.4	3.4	17.9	1	19.6	<0.2	<0.2	0.69	36.9
1,1,2-TRICHLOROETHANE	<0.5	<0.05	<0.05	<0.5	<0.05	<0.05	<0.2	<0.2	<0.05	<0.05
TRICHLOROETHENE	360	2.4	3.1	144	0.24	0.89	<0.2	<0.2	29.9	124
TRICHLOROFLUOROMETHANE	<5	<1	<1	<5	<1	<0.5	<0.5	<0.5	<1	<1
VINYL CHLORIDE	<2	<0.5	<0.5	<2	<0.5	<0.5	<0.2	<0.2	<0.5	<0.5
TRICHLOROTRIFLUOROETHANE	5.7	1.9	2.2	5.4	<1	17.6	<2	<0.2	0.81	4.1
2-CHLOROETHYL VINYL ETHER	<2	<0.5	<0.5	<2	<0.5	<0.5	<0.2	<0.2	<0.5	<0.5
BENZENE	.	.	.	.	.	.	.	.	.	.
TOLUENE	.	.	.	.	.	.	.	.	.	.
ETHYLBENZENE	.	.	.	.	.	.	.	.	.	.
1,2-DICHLOROBENZENE	.	.	.	.	.	.	.	.	.	.
1,4-DICHLOROBENZENE
ACETONE
O,P-XYLENE
M-XYLENE

TABLE SW-C.1
SWPL VOCS IN PPB

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WELL	MP20-C 10/04/85	MP20-C 10/04/85	MP20-C 11/08/85	MP20-C 12/09/85	MP20-C 03/17/86	MP20-C 03/17/86	MP20-C 06/10/86	MP20-C 06/10/86	MP20-C 11/06/90	MP20-C 01/23/91	MP52-B 08/29/85
DATE	FD	FO	FO	FO	FD	FO	FD	FO	FO	FO	FO
BROMODICHLOROMETHANE	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.1	<0.1	<0.2	<0.2	<0.5
BROMOFORM	<0.5	<0.5	<2	<2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.5
BROMOMETHANE	<2	<2	<12	<12	<2	<2	<2	<2	<0.2	<0.2	<2
CARBON TETRACHLORIDE	<0.5	<0.5	<2	<2	<0.5	1.4	<0.5	<0.5	<0.2	<0.2	<0.5
CHLOROBENZENE	<0.5	<0.5	<3	<3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
CHLOROETHANE	<1	<1	<6	<6	<1	<1	<1	<1	<0.2	<0.2	<1
CHLOROFORM	1.5	1.5	6.8	12.1	0.58	1.6	<0.05	<0.05	<0.2	<0.2	0.9
CHLOROMETHANE	<0.1	<0.1	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.1
DIBROMOCHLOROMETHANE	<0.1	<0.1	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.1
1,3-DICHLOROBENZENE	.	.	.	.	.	.	.	.	<0.5	<0.5	.
1,2&1,4-DICHLOROBENZENE	.	.	.	.	.	.	.	.	<0.5	<0.5	.
DICHLORODIFLUOROMETHANE	<2	<2	<20	<20	<2	<2	<2	<2	<0.2	<0.2	<2
1,1-DICHLOROETHANE	<0.1	<0.1	<1	<1	<0.1	1.1	<0.1	<0.1	<0.2	<0.2	<0.1
1,2-DICHLOROETHANE	<0.05	<0.05	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
1,1-DICHLOROETHENE	1.5	1.4	<2	<2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	1.7
1,2-DICHLOROETHENE(TOTAL)	1.9	2	<1	<1	0.7	1.7	<0.1	<0.1	<0.2	<0.2	<0.5
1,2-DICHLOROPROPANE	<0.05	<0.05	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
CIS-1,3-DICHLOROPROPENE	<0.5	<0.5	<2	<2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.5
TRANS-1,3-DICHLOROPROPENE	<0.5	<0.5	<4	<4	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.5
METHYLENE CHLORIDE	<0.5	<0.5	<3	<3	<0.5	<0.5	<0.5	<0.5	<2	<2	<0.5
1,1,2,2-TETRACHLOROETHANE	<0.05	<0.05	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TETRACHLOROETHENE	3	2.4	11.1	19.9	0.11	2.7	<0.05	<0.05	<0.2	<0.2	0.12
1,1,1-TRICHLOROETHANE	36.9	26.7	62.6	41.6	3.2	2.9	15.4	0.91	<0.2	<0.2	0.35
1,1,2-TRICHLOROETHANE	<0.05	<0.05	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TRICHLOROETHENE	124	119	8.2	230	49.6	51.8	0.24	0.26	<0.2	<0.2	0.45
TRICHLOROFLUOROMETHANE	<1	<1	<5	<5	<1	<1	<0.5	<0.5	<0.5	<0.5	<1
VINYL CHLORIDE	<0.5	<0.5	<2	<2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.5
TRICHLOROTRIFLUOROETHANE	4.1	3.4	<5	20.8	<1	<1	10.5	8.4	<2	<0.2	<1
2-CHLOROETHYLVINYL ETHER	<0.5	<0.5	<2	<2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.5
BENZENE	.	.	.	.	.	.	.	.	.	.	.
TOLUENE	.	.	.	.	.	.	.	.	.	.	.
ETHYLBENZENE	.	.	.	.	.	.	.	.	.	.	.
1,2-DICHLOROBENZENE	.	.	.	.	.	.	.	.	.	.	.
1,4-DICHLOROBENZENE
ACETONE
O,P-XYLENE
M-XYLENE

TABLE SW-C.1
SWPL VOCS IN PPB

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WELL	MP52-B									
DATE	10/01/85	11/05/85	12/04/85	12/04/85	01/23/86	03/17/86	06/05/86	08/26/86	05/26/87	11/18/87
SAMPLE CODE	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO
BROMODICHLOROMETHANE	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.1	<0.1	<0.05	<0.1
BROMOFORM	<0.5	<0.5	<2	<2	<1	<0.5	<0.5	<0.5	<0.1	<0.2
BROMOMETHANE	<2	<2	<12	<12	<10	<2	<2	<2	<0.1	<1.18
CARBON TETRACHLORIDE	<0.5	<0.5	<2	<2	<1	0.8	<0.5	<0.5	<0.1	<0.12
CHLORO BENZENE	<0.5	<0.5	<3	<3	<2	<0.5	<0.5	<0.5	<0.5	<0.25
CHLOROETHANE	<1	<1	<6	<6	<5	<1	<1	<1	<0.1	<0.52
CHLOROFORM	<0.1	<0.1	1.2	1.4	7.8	0.8	<0.05	<0.05	<0.05	<0.05
CHLOROMETHANE	<0.1	<0.1	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.05	<0.08
DIBROMOCHLOROMETHANE	<0.1	<0.1	<1	<1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.09
1,3-DICHLOROBENZENE	.	.	.	.	.	.	.	.	<0.5	<0.32
1,2&1,4-DICHLOROBENZENE	.	.	.	.	.	.	.	.	.	.
DICHLORODIFLUOROMETHANE	<2	<2	<20	<20	<10	<2	<2	<2	<0.05	<1.81
1,1-DICHLOROETHANE	<0.1	1.1	<1	<1	5.1	0.64	<0.1	<0.1	<0.05	<0.07
1,2-DICHLOROETHANE	<0.05	<0.05	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.1	<0.03
1,1-DICHLOROETHENE	<0.5	2.1	3.5	3.7	1.2	<0.5	<0.5	<0.5	<0.1	<0.13
1,2-DICHLOROETHENE(TOTAL)	12.6	<0.5	1.6	1.8	<0.5	0.9	<0.1	<0.1	<0.1	<0.1
1,2-DICHLOROPROPANE	<0.05	<0.05	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.04
CIS-1,3-DICHLOROPROPENE	<0.5	<0.5	<2	<2	<1	<0.5	<0.5	<0.5	<0.1	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.5	<0.5	<4	<4	<2	<0.5	<0.5	<0.5	<0.5	<0.34
METHYLENE CHLORIDE	<0.5	<0.5	<3	<3	<2	<0.5	<0.5	<0.5	<0.05	<0.25
1,1,2,2-TETRACHLOROETHANE	<0.05	<0.05	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.03
TETRACHLOROETHENE	1.2	5.9	2.9	2.8	4.6	6.2	<0.05	<0.05	<0.05	<0.03
1,1,1-TRICHLOROETHANE	0.78	3.8	60	50.6	6.8	1.6	0.16	0.63	<0.05	<0.03
1,1,2-TRICHLOROETHANE	<0.05	<0.05	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.02
TRICHLOROETHENE	17.8	40.1	11.8	13.8	23.1	4.4	1.9	2.6	6.7	<0.12
TRICHLOROFLUOROMETHANE	<1	<1	<5	<5	<5	<1	<0.5	<0.5	<0.1	<1
VINYL CHLORIDE	<0.5	<0.5	<2	<2	<1	<0.5	<0.5	<0.5	<0.05	<0.18
TRICHLOROTRIFLUOROETHANE	1.1	7.6	7.4	8.9	9.6	<1	<0.5	<0.5	<0.05	<2
2-CHLOROETHYL VINYL ETHER	<0.5	<0.5	<2	<2	<1	<0.5	<0.5	<0.5	<0.05	<0.13
BENZENE	.	.	.	.	.	.	.	.	<0.5	.
TOLUENE	.	.	.	.	.	.	.	.	<0.5	.
ETHYLBENZENE	.	.	.	.	.	.	.	.	<0.1	.
1,2-DICHLOROBENZENE	.	.	.	.	.	.	.	.	<0.5	<0.15
1,4-DICHLOROBENZENE	<1	<0.24
ACETONE	<50	.
O,P-XYLENE	<0.5	.
M-XYLENE	<0.5	.

TABLE SW-C.1
SWPL VOCS IN PPB

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WELL	MP52-B 09/16/88	MP52-B 01/16/89	MP52-B 11/17/89	MP52-B 11/22/89	MP52-C 08/26/85	MP52-C 10/08/85	MP52-C 11/07/85	MP52-C 01/23/86	MP52-C 03/12/86	MP52-C 06/05/86
DATE	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO
SAMPLE CODE	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO
BROMODICHLOROMETHANE	<0.1	<0.1	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1
BROMOFORM	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BROMOMETHANE	<1.8	<1.8	<0.2	<0.2	<2	<2	<2	<2	<2	<2
CARBON TETRACHLORIDE	<0.12	<0.12	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
CHLOROBENZENE	<0.25	<0.25	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
CHLOROETHANE	<0.52	<0.52	<0.2	<0.2	<1	<1	<1	<1	<1	<1
CHLOROFORM	<0.05	<0.05	<0.2	<0.2	<0.1	<0.1	<0.1	1.8	<0.1	<0.05
CHLOROMETHANE	<0.08	<0.08	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
DIBROMOCHLOROMETHANE	<0.09	<0.09	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,3-DICHLOROBENZENE	<0.32	<0.32	<0.5	<0.5	.	.	.	.	.	.
1,2&1,4-DICHLOROBENZENE	.	.	<0.5	<0.5	.	.	.	.	.	.
DICHLORODIFLUOROMETHANE	<1.81	<1.81	<0.2	<0.2	<2	<2	<2	<2	<2	<2
1,1-DICHLOROETHANE	<0.07	<0.07	<0.2	<0.2	<0.1	<0.1	<0.1	2.2	<0.1	<0.1
1,2-DICHLOROETHANE	<0.03	<0.03	<0.2	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1,1-DICHLOROETHENE	<0.13	<0.13	<0.2	<0.2	<0.5	<0.5	1.6	2.1	<0.5	<0.5
1,2-DICHLOROETHENE(TOTAL)	<0.1	<0.1	<0.2	<0.2	<0.5	<0.5	1.7	1.5	<0.5	<0.1
1,2-DICHLOROPROPANE	<0.04	<0.04	<0.2	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TRANS-1,3-DICHLOROPROPENE	<0.34	<0.34	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
METHYLENE CHLORIDE	<0.25	<0.25	<2	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2,2-TETRACHLOROETHANE	<0.03	<0.03	<0.2	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
TETRACHLOROETHENE	<0.03	<0.03	<0.2	<0.2	<0.05	1.1	3	2.1	<0.05	0.09
1,1,1-TRICHLOROETHANE	<0.03	<0.03	<0.2	<0.2	1.7	4	15.5	80.7	0.16	2.8
1,1,2-TRICHLOROETHANE	<0.02	<0.02	<0.2	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
TRICHLOROETHENE	<0.12	<0.12	<0.2	<0.2	4.3	3.4	47.2	347	0.22	21.5
TRICHLOROFLUOROMETHANE	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5
VINYL CHLORIDE	<0.18	<0.18	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TRICHLOROTRIFLUOROETHANE	<1	<1	<0.2	<0.2	<1	1.8	5.3	3.2	<1	<0.5
2-CHLOROETHYL VINYL ETHER	<0.13	<0.13	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BENZENE	.	.	.	.	.	.	.	.	.	.
TOLUENE	.	.	.	.	.	.	.	.	.	.
ETHYLBENZENE	.	.	.	.	.	.	.	.	.	.
1,2-DICHLOROBENZENE	<0.15	<0.15	.	.	.	.	.	.	.	.
1,4-DICHLOROBENZENE	<0.24	<0.24
ACETONE
O,P-XYLENE
M-XYLENE

TABLE SW-C.1
SWPL VOCS IN PPB

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WELL	MP52-C	MP53-B								
DATE	08/26/86	08/23/85	09/30/85	11/05/85	11/05/85	12/03/85	01/20/86	03/10/86	06/06/86	08/29/86
SAMPLE CODE	FO	FO	FO	FD	FO	FO	FO	FO	FO	FO
BROMODICHLOROMETHANE	<0.5	<10	<3	<0.5	<0.5	<1	<0.5	<0.5	<0.1	<0.1
BROMOFORM	<1	<20	<5	<0.5	<0.5	<2	<0.5	<0.5	<0.5	<0.5
BROMOMETHANE	<6	<200	<10	<2	<2	<12	<2	<2	<2	<2
CARBON TETRACHLORIDE	<1	<12	<3	<0.5	<0.5	<2	<0.5	<0.5	<0.5	<0.5
CHLOROBENZENE	<2	<25	<6	<0.5	<0.5	<3	<0.5	<0.5	<0.5	<0.5
CHLOROETHANE	<3	<60	<10	<1	<1	<6	<1	<1	<1	<1
CHLOROFORM	<0.5	<5	<2	1.2	1.2	<1	1.6	0.29	0.12	<0.05
CHLOROMETHANE	<0.5	<8	<10	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
DIBROMOCHLOROMETHANE	<0.5	<9	<4	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1
1,3-DICHLOROBENZENE	.	.	<2	.	.	.	.	.	.	.
1,2&1,4-DICHLOROBENZENE	.	.	.	.	.	.	.	.	.	.
DICHLORODIFLUOROMETHANE	<10	<200	<10	<2	<2	<20	<2	<2	<2	<2
1,1-DICHLOROETHANE	<0.5	<7	<5	0.11	<0.1	<1	<0.1	<0.1	<0.1	<0.1
1,2-DICHLOROETHANE	<0.5	<3	<3	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05
1,1-DICHLOROETHENE	<1	91	<3	1.5	1.5	16.2	<0.5	<0.5	<0.5	<0.5
1,2-DICHLOROETHENE(TOTAL)	<0.5	<10	<2	<0.5	<0.5	<1	<0.5	<0.5	<0.1	<0.1
1,2-DICHLOROPROPANE	<0.5	<4	<6	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05
CIS-1,3-DICHLOROPROPENE	<1	<20	<10	<0.5	<0.5	<2	<0.5	<0.5	<0.5	<0.5
TRANS-1,3-DICHLOROPROPENE	<2	<35	<5	<0.5	<0.5	<4	<0.5	<0.5	<0.5	<0.5
METHYLENE CHLORIDE	<2	<25	3.4	<0.5	<0.5	<3	<0.5	<0.5	<0.5	<0.5
1,1,2,2-TETRACHLOROETHANE	<0.5	<3	<7	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05
TETRACHLOROETHENE	<0.5	38.9	<5	2.5	2.4	22.5	0.1	<0.05	<0.05	<0.05
1,1,1-TRICHLOROETHANE	13	315	<4	18	18.4	266	2.6	2	0.85	0.16
1,1,2-TRICHLOROETHANE	<0.1	<2	<5	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05
TRICHLOROETHENE	<1	208	<2	61.6	66.5	385	1.2	1.9	0.32	0.29
TRICHLOROFLUOROMETHANE	<3	<50	<10	<1	<1	<5	<1	<1	<0.5	<0.5
VINYL CHLORIDE	<1	<18	<10	<0.5	<0.5	<2	<0.5	<0.5	<0.5	<0.5
TRICHLOROTRIFLUOROETHANE	<3	<50	<10	3.4	3.6	16.5	3	<1	<0.5	1.6
2-CHLOROETHYLVINYL ETHER	<1	<15	<10	<0.5	<0.5	<2	<0.5	<0.5	<0.5	<0.5
BENZENE	.	.	<5	.	.	.	.	.	.	.
TOLUENE	.	.	<6	.	.	.	.	.	.	.
ETHYLBENZENE	.	.	<8	.	.	.	.	.	.	.
1,2-DICHLOROBENZENE	.	.	<2	.	.	.	.	.	.	.
1,4-DICHLOROBENZENE	.	.	<5
ACETONE	.	.	<10
O,P-XYLENE
M-XYLENE

TABLE SW-C.1
SWPL VOCS IN PPB

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WELL	MP53-B	MP53-B	MP53-B	MP53-B	MP53-B	MP53-B	MP53-C	MP53-C	MP53-C	MP53-C
DATE	05/20/87	11/17/87	09/16/88	01/13/89	11/16/89	11/22/89	08/26/85	08/26/85	10/02/85	11/11/85
SAMPLE CODE	FO	FO	FO	FO	FO	FO	FD	FO	FO	FO
BROMODICHLOROMETHANE	<0.05	<0.1	<0.1	<0.1	<0.2	<0.2	<0.5	<0.5	<1	<1
BROMOFORM	<0.1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<2	<2
BROMOMETHANE	<0.1	<1.18	<1.8	<1.8	<0.2	<0.2	<2	<2	<12	<12
CARBON TETRACHLORIDE	<0.1	<0.12	<0.12	<0.12	<0.2	<0.2	<0.5	<0.5	<2	<2
CHLORO BENZENE	<0.5	<0.25	<0.25	<0.25	<0.2	<0.5	<0.5	<0.5	<3	<3
CHLOROETHANE	<0.1	<0.52	<0.52	<0.52	<0.2	<0.2	<1	<1	<6	<6
CHLOROFORM	0.5	<0.05	<0.05	<0.05	0.5	0.7	<0.1	<0.1	<1	<1
CHLOROMETHANE	<0.05	<0.08	<0.08	<0.08	<0.2	<0.2	<0.1	<0.1	<0.5	<0.5
DIBROMOCHLOROMETHANE	<0.1	<0.09	<0.09	<0.09	<0.2	<0.2	<0.1	<0.1	<1	<1
1,3-DICHLOROBENZENE	<0.5	<0.32	<0.32	<0.32	<0.5	<0.5	.	.	.	.
1,2&1,4-DICHLOROBENZENE	.	.	.	.	<0.5	<0.5	.	.	.	.
DICHLORODIFLUOROMETHANE	<0.05	<1.81	<1.81	<1.81	<0.2	<0.2	<2	<2	<20	<20
1,1-DICHLOROETHANE	<0.05	<0.07	<0.07	<0.07	<0.2	<0.2	<0.1	<0.1	<1	<1
1,2-DICHLOROETHANE	<0.1	<0.03	<0.03	<0.03	<0.2	<0.2	<0.05	<0.05	<0.5	<0.5
1,1-DICHLOROETHENE	<0.1	<0.13	<0.13	<0.13	<0.2	<0.2	0.57	1.3	6.5	<2
1,2-DICHLOROETHENE(TOTAL)	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	0.67	1.5	<1	<1
1,2-DICHLOROPROPANE	<0.05	<0.04	<0.04	<0.04	<0.2	<0.2	<0.05	<0.05	<0.5	<0.5
CIS-1,3-DICHLOROPROPENE	<0.1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<2	<2
TRANS-1,3-DICHLOROPROPENE	<0.5	<0.34	<0.34	<0.34	<0.2	<0.2	<0.5	<0.5	<4	<4
METHYLENE CHLORIDE	<0.05	<0.25	<0.25	<0.25	<2	<2	<0.5	<0.5	<3	<3
1,1,2,2-TETRACHLOROETHANE	<0.05	<0.03	<0.03	<0.03	<0.2	<0.2	<0.05	<0.05	<0.5	<0.5
TETRACHLOROETHENE	<0.05	<0.03	<0.03	<0.03	<0.2	<0.2	0.66	0.7	7.4	<0.5
1,1,1-TRICHLOROETHANE	<0.05	<0.03	<0.03	<0.03	<0.2	<0.2	0.58	0.18	168	85.1
1,1,2-TRICHLOROETHANE	<0.05	<0.02	<0.02	<0.02	<0.2	<0.2	<0.05	<0.05	<0.5	<0.5
TRICHLOROETHENE	<0.1	<0.12	<0.12	<0.12	<0.2	0.2	21.9	25.5	840	186
TRICHLOROFLUOROMETHANE	<0.1	<1	<1	<1	<0.5	<0.5	<1	<1	<5	<5
VINYL CHLORIDE	<0.05	<0.18	<0.18	<0.18	<0.2	<0.2	<0.5	<0.5	<2	<2
TRICHLORO TRIFLUOROETHANE	<0.05	<2	<1	<1	<0.2	<0.2	<1	<1	12.4	12
2-CHLOROETHYL VINYL ETHER	<0.05	<0.13	<0.13	<0.13	<0.2	<0.2	<0.5	<0.5	<2	<2
BENZENE	<0.5	.	.	.	.	.	.	.	.	.
TOLUENE	<0.5	.	.	.	.	.	.	.	.	.
ETHYLBENZENE	<0.1	.	.	.	.	.	.	.	.	.
1,2-DICHLOROBENZENE	<0.5	<0.15	<0.15	<0.15	.	.	.	.	.	.
1,4-DICHLOROBENZENE	<1	<0.24	<0.24	<0.24
ACETONE	<50
O,P-XYLENE	<0.5
M-XYLENE	<0.5

TABLE SW-C.1
SWPL VOCS IN PPB

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WELL	MP53-C 12/09/85	MP53-C 01/27/86	MP53-C 03/13/86	MP53-C 06/06/86	MP53-C 08/29/86	MP53-C 05/20/87	MP53-C 11/17/87	MP53-C 11/17/87	MP53-C 09/16/88	MP53-C 01/12/89
DATE	FO	FO	FO	FO	FO	FO	FO	FO	FO	FO
SAMPLE CODE										
BROMODICHLOROMETHANE	<1	<1	<0.5	<1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1
BROMOFORM	<2	<2	<0.5	<2	<0.5	<0.1	<0.2	<0.2	<0.2	<0.2
BROMOMETHANE	<12	<12	<2	<12	<2	<0.1	<1.18	<1.18	<1.8	<1.8
CARBON TETRACHLORIDE	<2	<2	<0.5	<2	<0.5	<0.1	<0.12	<0.12	<0.12	<0.12
CHLOROENZENE	<3	<3	<0.5	<3	<0.5	<0.5	<0.25	<0.25	<0.25	<0.25
CHLOROETHANE	<6	<6	<1	<6	<1	<0.1	<0.52	<0.52	<0.52	<0.52
CHLOROFORM	11.9	<1	<0.1	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
CHLOROMETHANE	<0.5	<0.5	<0.1	<1	<0.1	<0.05	<0.08	<0.08	<0.08	<0.08
DIBROMOCHLOROMETHANE	<1	<1	<0.1	<1	<0.1	<0.1	<0.09	<0.09	<0.09	<0.09
1,3-DICHLOROBENZENE	.	.	.	.	.	<0.5	<0.32	<0.32	<0.32	<0.32
1,2&1,4-DICHLOROBENZENE	.	.	.	.	.	.	.	.	.	.
DICHLORODIFLUOROMETHANE	<20	<20	<2	<20	<2	<0.05	<1.81	<1.81	<1.81	<1.81
1,1-DICHLOROETHANE	<1	<1	<0.1	<1	<0.1	<0.05	<0.07	<0.07	<0.07	<0.07
1,2-DICHLOROETHANE	<0.5	<0.5	<0.05	<0.5	<0.05	<0.1	<0.03	<0.03	<0.03	<0.03
1,1-DICHLOROETHENE	<2	<2	<0.5	<2	<0.5	<0.1	<0.13	<0.13	<0.13	<0.13
1,2-DICHLOROETHENE(TOTAL)	16.4	6.1	<0.5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,2-DICHLOROPROPANE	<0.5	<0.5	<0.05	<0.5	<0.05	<0.05	<0.04	<0.04	<0.04	<0.04
CIS-1,3-DICHLOROPROPENE	<2	<2	<0.5	<2	<0.5	<0.1	<0.2	<0.2	<0.2	<0.2
TRANS-1,3-DICHLOROPROPENE	<4	<4	<0.5	<4	<0.5	<0.5	<0.34	<0.34	<0.34	<0.34
METHYLENE CHLORIDE	<3	<3	<0.5	<3	<0.5	<0.05	<0.25	<0.25	<0.25	<0.25
1,1,2,2-TETRACHLOROETHANE	<0.5	<0.5	<0.05	<0.5	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03
TETRACHLOROETHENE	22.4	21.1	<0.05	<0.5	<0.05	<0.05	<0.03	<0.03	<0.03	0.22
1,1,1-TRICHLOROETHANE	74.7	193	1.4	6.3	<0.05	<0.05	0.08	0.07	<0.03	<0.03
1,1,2-TRICHLOROETHANE	<0.5	<0.5	<0.05	<0.5	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02
TRICHLOROETHENE	570	1006	0.82	4.1	3.4	0.8	<0.12	<0.12	<0.12	0.3
TRICHLOROFLUOROMETHANE	<5	<5	<1	<5	<0.5	<0.1	<1	<1	<1	<1
VINYL CHLORIDE	<2	<2	<0.5	<2	<0.5	<0.05	<0.18	<0.18	<0.18	<0.18
TRICHLOROTRIFLUOROETHANE	27.5	51.6	<1	116	<0.5	<0.05	<2	<2	<1	<1
2-CHLOROETHYL VINYL ETHER	<2	<2	<0.5	<2	<0.5	<0.05	<0.13	<0.13	<0.13	<0.13
BENZENE	.	.	.	.	.	<0.5	.	.	.	.
TOLUENE	.	.	.	.	.	<0.5	.	.	.	.
ETHYLBENZENE	.	.	.	.	.	<0.1	.	.	.	.
1,2-DICHLOROBENZENE	.	.	.	.	.	<0.5	<0.15	<0.15	<0.15	<0.15
1,4-DICHLOROBENZENE	<1	<0.24	<0.24	<0.24	<0.24
ACETONE	<50
O,P-XYLENE	<0.5
M-XYLENE	<0.5

TABLE SW-C.1
SWPL VOCS IN PPB

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WELL	MP53-C	MP53-C	MP53-C	MP53-C	MP53-C	MP53-D	MP53-D	MP53-D	MP53-D	MP53-D
DATE	01/12/89	11/16/89	11/16/89	11/22/89	11/22/89	08/23/85	08/23/85	09/30/85	11/04/85	01/20/86
SAMPLE CODE	FO	FD	FO	FD	FO	FD	FO	FO	FO	FD
BROMODICHLOROMETHANE	<0.1	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<3	<1	<0.5
BROMOFORM	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<5	<2	<0.5
BROMOMETHANE	<1.8	<0.2	<0.2	<0.2	<0.2	<2	<2	<10	<12	<2
CARBON TETRACHLORIDE	<0.12	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<3	<2	<0.5
CHLOROENZENE	<0.25	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<6	<3	<0.5
CHLOROETHANE	<0.52	<0.2	<0.2	<0.2	<0.2	<1	<1	<10	<6	<1
CHLOROFORM	<0.05	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	<2	<1	<0.1
CHLOROMETHANE	<0.08	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	<10	<0.5	<0.1
DIBROMOCHLOROMETHANE	<0.09	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	<4	<1	<0.1
1,3-DICHLOROBENZENE	<0.32	<0.5	<0.5	<0.5	<0.5	.	.	<2	.	.
1,2&1,4-DICHLOROBENZENE	.	<0.5	<0.5	<0.5	<0.5	.	.	.	.	.
DICHLORODIFLUOROMETHANE	<1.81	<0.2	<0.2	<0.2	<0.2	<2	<2	<10	<20	<2
1,1-DICHLOROETHANE	<0.07	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	<5	1.1	<0.1
1,2-DICHLOROETHANE	<0.03	<0.2	<0.2	<0.2	<0.2	<0.05	<0.05	<3	<0.5	<0.05
1,1-DICHLOROETHENE	<0.13	<0.2	<0.2	<0.2	<0.2	0.49	0.81	<3	2.7	<0.5
1,2-DICHLOROETHENE(TOTAL)	<0.1	<0.2	<0.2	0.2	<0.2	<0.5	0.69	<2	1.3	<0.5
1,2-DICHLOROPROPANE	<0.04	<0.2	<0.2	<0.2	<0.2	<0.05	<0.05	<6	<0.5	<0.05
CIS-1,3-DICHLOROPROPENE	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<10	<2	<0.5
TRANS-1,3-DICHLOROPROPENE	<0.34	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<5	<4	<0.5
METHYLENE CHLORIDE	<0.25	<2	<2	<2	<2	<0.5	<0.5	<3	<3	<0.5
1,1,2,2-TETRACHLOROETHANE	<0.03	<0.2	<0.2	<0.2	<0.2	<0.05	<0.05	<7	<0.5	<0.05
TETRACHLOROETHENE	0.27	<0.2	<0.2	<0.2	<0.2	0.3	2.3	<5	9.1	0.14
1,1,1-TRICHLOROETHANE	<0.03	<0.2	<0.2	<0.2	<0.2	0.36	0.59	<4	43.1	9.1
1,1,2-TRICHLOROETHANE	<0.02	<0.2	<0.2	<0.2	<0.2	<0.05	<0.05	<5	<0.5	<0.05
TRICHLOROETHENE	0.32	0.2	0.3	2.9	1.1	0.82	21.7	16.7	94.1	47.3
TRICHLOROFLUOROMETHANE	<1	<0.5	<0.5	<0.5	<0.5	<1	<1	<10	<5	<1
VINYL CHLORIDE	<0.18	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<10	<2	<0.5
TRICHLOROTRIFLUOROETHANE	<1	<0.2	<0.2	<0.2	<0.2	<1	<1	<10	14.5	1.5
2-CHLOROETHYLVINYL ETHER	<0.13	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<10	<2	<0.5
BENZENE	.	.	.	.	.	.	.	<5	.	.
TOLUENE	.	.	.	.	.	.	.	<6	.	.
ETHYLBENZENE	.	.	.	.	.	.	.	<8	.	.
1,2-DICHLOROBENZENE	<0.15	.	.	.	.	.	.	<2	.	.
1,4-DICHLOROBENZENE	<0.24	<5	.	.
ACETONE	<10	.	.
O,P-XYLENE
M-XYLENE

TABLE SW-C.1
SWPL VOCS IN PPB

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WELL	MP53-D	MP53-D	MP53-D	MP53-D	MP53-D	MP53-D
DATE	01/20/86	03/10/86	06/06/86	01/12/89	11/16/89	11/22/89
SAMPLE CODE	FO	FO	FO	FO	FO	FO
BROMODICHLOROMETHANE	<0.5	<0.5	<0.1	<0.1	<0.2	<0.2
BROMOFORM	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2
BROMOMETHANE	<2	<2	<2	<1.8	<0.2	<0.2
CARBON TETRACHLORIDE	<0.5	<0.5	<0.5	<0.12	<0.2	<0.2
CHLOROBENZENE	<0.5	<0.5	<0.5	<0.25	<0.5	<0.5
CHLOROETHANE	<1	<1	<1	<0.52	<0.2	<0.2
CHLOROFORM	<0.1	<0.1	<0.05	<0.05	<0.2	<0.2
CHLOROMETHANE	<0.1	<0.1	<0.1	<0.08	<0.2	<0.2
DIBROMOCHLOROMETHANE	<0.1	<0.1	<0.1	<0.09	<0.2	<0.2
1,3-DICHLOROBENZENE	.	.	.	<0.32	<0.5	<0.5
1,2&1,4-DICHLOROBENZENE	.	.	.	.	<0.5	<0.5
DICHLORODIFLUOROMETHANE	<2	<2	<2	<1.81	<0.2	<0.2
1,1-DICHLOROETHANE	<0.1	<0.1	<0.1	<0.07	<0.2	<0.2
1,2-DICHLOROETHANE	<0.05	<0.05	<0.05	<0.03	<0.2	<0.2
1,1-DICHLOROETHENE	<0.5	<0.5	<0.5	<0.13	<0.2	<0.2
1,2-DICHLOROETHENE(TOTAL)	<0.5	<0.5	<0.1	<0.1	<0.2	<0.2
1,2-DICHLOROPROPANE	<0.05	<0.05	<0.05	<0.04	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.5	<0.5	<0.5	<0.34	<0.2	<0.2
METHYLENE CHLORIDE	<0.5	<0.5	<0.5	<0.25	<2	<2
1,1,2,2-TETRACHLOROETHANE	<0.05	<0.05	<0.05	<0.03	<0.2	<0.2
TETRACHLOROETHENE	0.1	<0.05	<0.05	<0.03	<0.2	<0.2
1,1,1-TRICHLOROETHANE	7.1	7.7	3.4	<0.03	<0.2	<0.2
1,1,2-TRICHLOROETHANE	<0.05	<0.05	<0.05	<0.02	<0.2	<0.2
TRICHLOROETHENE	37.1	48.6	0.53	1.66	<0.2	0.3
TRICHLOROFLUOROMETHANE	<1	<1	<0.5	<1	<0.5	<0.5
VINYL CHLORIDE	<0.5	<0.5	<0.5	<0.18	<0.2	<0.2
TRICHLOROTRIFLUOROETHANE	0.87	10.3	12.3	<1	<0.2	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5	<0.5	<0.5	<0.13	<0.2	<0.2
BENZENE	.	.	.	.	.	.
TOLUENE	.	.	.	.	.	.
ETHYLBENZENE	.	.	.	.	.	.
1,2-DICHLOROBENZENE	.	.	.	<0.15	.	.
1,4-DICHLOROBENZENE	.	.	.	<0.24	.	.
ACETONE	.	.	.	.	.	.
O,P-XYLENE	.	.	.	.	.	.
M-XYLENE	.	.	.	.	.	.

APPENDIX SW-D

WATER LEVEL ELEVATION DATA (1985 THROUGH 1991)

Water level elevations measured in SWPL area monitor wells including DM 107, DM 123, DM 124, DM 201, DM 201OB1, DM 201OB2, DM 201OB3, DM 503, DM 701, MP 16, MP 20, MP 52, MP 53, and 48&VB (Langmade) are summarized in Table SW-D.1.

TABLE SW-D.1
 SWPL GROUND-WATER ELEVATIONS
 IN FEET ABOVE MEAN SEA LEVEL

MI52 FR RI REPORT
 February 1992

OBS	WELL	DATE	WATER ELEVATION
1	48&VB	09/13/85	1151.77
2	48&VB	12/02/85	1169.15
3	48&VB	03/03/86	1156.40
4	48&VB	03/31/86	1155.65
5	48&VB	06/04/86	1155.66
6	48&VB	09/09/86	1157.93
7	DM107	03/04/86	1180.77
8	DM107	06/02/86	1179.22
9	DM107	09/09/86	1180.80
10	DM107	05/27/87	1177.81
11	DM107	11/20/87	1177.43
12	DM107	09/13/88	1176.63
13	DM107	01/10/89	1178.21
14	DM107	11/14/89	1175.11
15	DM107	10/24/90	1179.63
16	DM107	01/07/91	1179.33
17	DM107	02/06/91	1177.48
18	DM107	07/01/91	1175.24
19	DM107	07/03/91	1175.28
20	DM124	09/09/86	1146.10
21	DM124	09/12/88	1142.41
22	DM124	01/10/89	1142.86
23	DM124	11/13/89	1142.22
24	DM124	10/24/90	1143.15
25	DM124	01/02/91	1143.29
26	DM124	06/28/91	1139.19
27	DM124	07/03/91	1139.53
28	DM124	07/17/91	1135.94
29	DM201	06/02/86	1176.29
30	DM201	01/10/89	1173.14
31	DM201	10/24/90	1167.73
32	DM201	01/07/91	1172.47
33	DM201	02/06/91	1172.33
34	DM201	03/13/91	1137.88
35	DM201	03/15/91	1136.12
36	DM201	03/18/91	1137.12
37	DM201	03/20/91	1133.23
38	DM201	03/22/91	1132.08
39	DM201	03/25/91	1140.14
40	DM201	03/28/91	1156.74
41	DM201	04/01/91	1146.88
42	DM201	04/03/91	1138.88
43	DM201	04/12/91	1172.14
44	DM201	04/15/91	1172.56
45	DM201	05/24/91	1164.69
46	DM201	06/07/91	1159.29
47	DM201-OB1	01/10/89	1173.20
48	DM201-OB1	11/15/89	1172.90
49	DM201-OB1	02/06/91	1172.11
50	DM201-OB1	02/28/91	1171.94
51	DM201-OB1	03/20/91	1171.28
52	DM201-OB1	03/29/91	1171.70
53	DM201-OB1	04/03/91	1171.54
54	DM201-OB1	04/12/91	1172.04
55	DM201-OB2	04/01/86	1175.28
56	DM201-OB2	09/13/88	1171.24
57	DM201-OB2	01/10/89	1171.40
58	DM201-OB2	02/06/91	1170.04
59	DM201-OB2	03/01/91	1169.94
60	DM201-OB2	03/20/91	1168.62
61	DM201-OB2	03/29/91	1169.36

TABLE SW-D.1
 SWPL GROUND-WATER ELEVATIONS
 IN FEET ABOVE MEAN SEA LEVEL

MI52 FR RI REPORT
 February 1992

OBS	WELL	DATE	WATER ELEVATION
62	DM201-OB2	04/03/91	1169.12
63	DM201-OB2	04/12/91	1169.68
64	DM201-OB3	02/06/91	1172.60
65	DM201-OB3	03/01/91	1172.66
66	DM201-OB3	03/20/91	1172.54
67	DM201-OB3	03/29/91	1172.61
68	DM201-OB3	04/03/91	1172.58
69	DM201-OB3	04/12/91	1172.76
70	DM503	01/02/91	1118.09
71	DM503	06/17/91	1112.71
72	DM503	06/28/91	1112.45
73	DM503	07/03/91	1112.35
74	DM503	07/17/91	1108.68
75	DM701	11/01/91	1146.31
76	DM701	11/04/91	1146.12
77	DM701	11/07/91	1146.05
78	DM701	12/05/91	1146.81
79	MP16-A	08/19/85	1169.10
80	MP16-A	09/27/85	1169.00
81	MP16-A	11/04/85	1169.00
82	MP16-A	12/02/85	1169.19
83	MP16-A	01/06/86	1169.14
84	MP16-A	02/04/86	1168.85
85	MP16-A	03/03/86	1168.87
86	MP16-A	03/31/86	1169.48
87	MP16-A	06/02/86	1168.51
88	MP16-A	09/09/86	1168.47
89	MP16-A	05/20/87	1165.75
90	MP16-A	11/18/87	1165.79
91	MP16-A	09/13/88	1163.50
92	MP16-A	01/10/89	1165.40
93	MP16-A	11/15/89	1163.07
94	MP16-A	10/24/90	1163.65
95	MP16-A	01/07/91	1163.79
96	MP16-A	02/06/91	1162.91
97	MP16-A	04/15/91	1163.98
98	MP16-A	07/03/91	1162.35
99	MP16-A	07/03/91	1162.93
100	MP16-B	08/19/85	1169.40
101	MP16-B	09/27/85	1169.30
102	MP16-B	11/04/85	1169.40
103	MP16-B	12/02/85	1169.52
104	MP16-B	01/06/86	1169.47
105	MP16-B	02/04/86	1168.87
106	MP16-B	03/03/86	1169.21
107	MP16-B	03/31/86	1169.80
108	MP16-B	06/02/86	1168.87
109	MP16-B	09/09/86	1168.86
110	MP16-B	09/13/88	1164.48
111	MP16-B	01/10/89	1166.24
112	MP16-B	11/15/89	1163.91
113	MP16-B	02/06/91	1163.84
114	MP16-B	04/15/91	1165.04
115	MP16-B	07/03/91	1163.44
116	MP16-C	08/19/85	1169.60
117	MP16-C	09/27/85	1169.30
118	MP16-C	11/04/85	1169.58
119	MP16-C	12/02/85	1169.54
120	MP16-C	01/06/86	1169.55
121	MP16-C	02/04/86	1169.06
122	MP16-C	03/03/86	1169.46

TABLE SW-D.1
 SWPL GROUND-WATER ELEVATIONS
 IN FEET ABOVE MEAN SEA LEVEL

MI52 FR RI REPORT
 February 1992

OBS	WELL	DATE	WATER ELEVATION
123	MP16-C	03/31/86	1169.78
124	MP16-C	06/02/86	1169.14
125	MP16-C	09/09/86	1168.74
126	MP16-C	05/20/87	1166.85
127	MP16-C	11/17/87	1166.95
128	MP16-C	09/13/88	1161.20
129	MP16-C	01/10/89	1163.94
130	MP16-C	11/15/89	1164.15
131	MP16-C	10/24/90	1164.86
132	MP16-C	01/08/91	1164.92
133	MP16-C	02/06/91	1163.95
134	MP16-C	07/03/91	1163.63
135	MP16-D	08/19/85	1170.00
136	MP16-D	09/27/85	1169.30
137	MP16-D	11/04/85	1169.49
138	MP16-D	12/02/85	1169.82
139	MP16-D	01/06/86	1169.61
140	MP16-D	02/04/86	1169.29
141	MP16-D	03/03/86	1169.53
142	MP16-D	03/31/86	1168.86
143	MP16-D	06/02/86	1169.33
144	MP16-D	09/09/86	1168.76
145	MP16-D	09/13/88	1161.14
146	MP16-D	01/10/89	1164.12
147	MP16-D	11/15/89	1164.19
148	MP16-D	02/06/91	1163.98
149	MP16-D	07/03/91	1164.21
150	MP20-A	08/19/85	1193.70
151	MP20-A	09/27/85	1193.10
152	MP20-A	12/02/85	1192.91
153	MP20-A	01/06/86	1192.86
154	MP20-A	01/31/86	1192.66
155	MP20-A	02/01/86	1192.65
156	MP20-A	02/02/86	1192.64
157	MP20-A	02/03/86	1192.64
158	MP20-A	02/04/86	1192.64
159	MP20-A	02/05/86	1192.64
160	MP20-A	02/06/86	1192.63
161	MP20-A	02/07/86	1192.62
162	MP20-A	02/08/86	1192.62
163	MP20-A	02/09/86	1192.62
164	MP20-A	02/10/86	1192.61
165	MP20-A	02/11/86	1192.61
166	MP20-A	02/12/86	1192.61
167	MP20-A	02/13/86	1192.62
168	MP20-A	02/14/86	1192.61
169	MP20-A	02/15/86	1192.61
170	MP20-A	02/16/86	1192.60
171	MP20-A	02/17/86	1192.63
172	MP20-A	02/18/86	1192.66
173	MP20-A	02/19/86	1192.66
174	MP20-A	02/20/86	1192.66
175	MP20-A	02/21/86	1192.66
176	MP20-A	02/22/86	1192.66
177	MP20-A	02/23/86	1192.65
178	MP20-A	02/24/86	1192.65
179	MP20-A	02/25/86	1192.66
180	MP20-A	02/26/86	1192.66
181	MP20-A	02/27/86	1192.66
182	MP20-A	02/28/86	1192.65
183	MP20-A	03/01/86	1192.65

TABLE SW-D.1
 SWPL GROUND-WATER ELEVATIONS
 IN FEET ABOVE MEAN SEA LEVEL

MI52 FR RI REPORT
 February 1992

OBS	WELL	DATE	WATER ELEVATION
184	MP20-A	03/02/86	1192.63
185	MP20-A	03/03/86	1192.49
186	MP20-A	04/01/86	1192.27
187	MP20-A	06/02/86	1191.78
188	MP20-A	09/09/86	1190.85
189	MP20-A	09/13/88	1187.94
190	MP20-A	01/10/89	1189.45
191	MP20-A	11/15/89	1188.91
192	MP20-A	10/24/90	1188.62
193	MP20-A	01/07/91	1187.22
194	MP20-A	02/06/91	1187.91
195	MP20-B	08/19/85	1193.80
196	MP20-B	09/27/85	1193.30
197	MP20-B	11/04/85	1193.03
198	MP20-B	12/02/85	1193.07
199	MP20-B	01/06/86	1193.10
200	MP20-B	02/04/86	1192.86
201	MP20-B	03/03/86	1192.61
202	MP20-B	04/01/86	1192.43
203	MP20-B	06/02/86	1191.80
204	MP20-B	09/09/86	1190.89
205	MP20-B	09/13/88	1188.90
206	MP20-B	01/10/89	1189.34
207	MP20-B	11/15/89	1188.93
208	MP20-B	10/24/90	1188.76
209	MP20-B	01/07/91	1188.46
210	MP20-B	02/06/91	1188.05
211	MP20-C	08/19/85	1193.50
212	MP20-C	09/27/85	1193.10
213	MP20-C	11/04/85	1192.82
214	MP20-C	12/02/85	1192.83
215	MP20-C	01/06/86	1192.86
216	MP20-C	02/04/86	1192.78
217	MP20-C	03/03/86	1192.42
218	MP20-C	04/01/86	1192.23
219	MP20-C	06/02/86	1191.53
220	MP20-C	09/09/86	1190.77
221	MP20-C	09/13/88	1189.04
222	MP20-C	01/10/89	1189.54
223	MP20-C	11/15/89	1188.79
224	MP20-C	10/24/90	1188.48
225	MP20-C	01/07/91	1188.09
226	MP20-C	02/06/91	1187.81
227	MP20-D	08/19/85	1193.50
228	MP20-D	09/27/85	1193.10
229	MP20-D	11/04/85	1192.65
230	MP20-D	12/02/85	1192.81
231	MP20-D	01/06/86	1192.76
232	MP20-D	02/04/86	1192.67
233	MP20-D	03/03/86	1192.72
234	MP20-D	06/02/86	1191.55
235	MP20-D	09/09/86	1190.88
236	MP20-D	09/13/88	1188.35
237	MP20-D	01/10/89	1189.74
238	MP20-D	11/15/89	1188.95
239	MP20-D	10/24/90	1189.27
240	MP52-A	08/19/85	1142.00
241	MP52-A	09/27/85	1142.00
242	MP52-A	09/30/85	1142.10
243	MP52-A	11/04/85	1142.92
244	MP52-A	12/02/85	1143.69

TABLE SW-D.1
 SWPL GROUND-WATER ELEVATIONS
 IN FEET ABOVE MEAN SEA LEVEL

MI52 FR RI REPORT
 February 1992

OBS	WELL	DATE	WATER ELEVATION
245	MP52-A	01/06/86	1143.33
246	MP52-A	02/04/86	1142.60
247	MP52-A	03/03/86	1142.69
248	MP52-A	03/31/86	1143.74
249	MP52-A	06/02/86	1142.66
250	MP52-A	09/09/86	1144.46
251	MP52-B	08/19/85	1142.00
252	MP52-B	09/27/85	1142.20
253	MP52-B	09/30/85	1142.20
254	MP52-B	11/04/85	1142.15
255	MP52-B	12/02/85	1141.73
256	MP52-B	01/06/86	1141.20
257	MP52-B	02/04/86	1140.91
258	MP52-B	03/03/86	1140.86
259	MP52-B	03/31/86	1140.66
260	MP52-B	06/02/86	1140.26
261	MP52-B	09/09/86	1140.51
262	MP52-B	05/26/87	1138.62
263	MP52-B	11/18/87	1139.97
264	MP52-B	09/12/88	1138.85
265	MP52-B	01/10/89	1138.76
266	MP52-B	11/13/89	1137.75
267	MP52-C	08/19/85	1141.10
268	MP52-C	09/27/85	1141.30
269	MP52-C	09/30/85	1141.20
270	MP52-C	11/04/85	1141.35
271	MP52-C	12/02/85	1141.15
272	MP52-C	01/06/86	1140.45
273	MP52-C	02/04/86	1140.20
274	MP52-C	03/03/86	1139.91
275	MP52-C	03/31/86	1140.82
276	MP52-C	06/02/86	1139.30
277	MP52-C	09/09/86	1139.64
278	MP52-C	09/12/88	1137.84
279	MP52-C	01/10/89	1138.05
280	MP52-C	11/13/89	1136.83
281	MP52-D	08/19/85	965.50
282	MP52-D	09/27/85	1059.80
283	MP52-D	09/30/85	1072.70
284	MP52-D	11/04/85	1131.52
285	MP52-D	12/02/85	1140.55
286	MP52-D	01/06/86	1139.58
287	MP52-D	02/04/86	1139.45
288	MP52-D	03/03/86	1139.45
289	MP52-D	03/31/86	1139.37
290	MP52-D	06/02/86	1139.11
291	MP52-D	09/09/86	1138.92
292	MP53-A	08/19/85	1153.20
293	MP53-A	09/27/85	1154.10
294	MP53-A	09/30/85	1154.00
295	MP53-A	11/05/85	1154.58
296	MP53-A	12/02/85	1154.71
297	MP53-A	01/06/86	1154.76
298	MP53-A	02/04/86	1154.70
299	MP53-A	03/03/86	1154.67
300	MP53-A	03/31/86	1154.52
301	MP53-A	06/02/86	1154.32
302	MP53-A	09/09/86	1154.02
303	MP53-B	08/19/85	1155.30
304	MP53-B	09/27/85	1155.30
305	MP53-B	09/30/85	1155.00

TABLE SW-D.1
 SWPL GROUND-WATER ELEVATIONS
 IN FEET ABOVE MEAN SEA LEVEL

MI52 FR RI REPORT
 February 1992

OBS	WELL	DATE	WATER ELEVATION
306	MP53-B	11/05/85	1155.08
307	MP53-B	12/02/85	1154.81
308	MP53-B	01/06/86	1154.69
309	MP53-B	02/04/86	1154.43
310	MP53-B	03/03/86	1154.13
311	MP53-B	03/31/86	1154.00
312	MP53-B	06/02/86	1153.76
313	MP53-B	09/09/86	1153.79
314	MP53-B	05/20/87	1151.90
315	MP53-B	11/17/87	1152.12
316	MP53-B	09/12/88	1150.30
317	MP53-B	01/10/89	1150.80
318	MP53-B	11/13/89	1152.01
319	MP53-C	08/19/85	1156.20
320	MP53-C	09/27/85	1156.20
321	MP53-C	09/30/85	1155.90
322	MP53-C	11/05/85	1155.95
323	MP53-C	12/02/85	1155.73
324	MP53-C	01/06/86	1155.51
325	MP53-C	02/04/86	1155.28
326	MP53-C	03/03/86	1155.23
327	MP53-C	03/31/86	1154.92
328	MP53-C	06/02/86	1154.61
329	MP53-C	09/09/86	1154.67
330	MP53-C	05/20/87	1152.85
331	MP53-C	11/17/87	1152.75
332	MP53-C	09/12/88	1151.15
333	MP53-C	01/10/89	1151.85
334	MP53-C	11/13/89	1150.63
335	MP53-D	08/19/85	1157.50
336	MP53-D	09/27/85	1157.50
337	MP53-D	09/30/85	1157.30
338	MP53-D	11/05/85	1157.27
339	MP53-D	12/02/85	1157.14
340	MP53-D	01/06/86	1157.04
341	MP53-D	02/04/86	1156.90
342	MP53-D	03/03/86	1156.55
343	MP53-D	03/31/86	1156.35
344	MP53-D	06/02/86	1156.10
345	MP53-D	09/09/86	1156.10
346	MP53-D	09/12/88	1152.63
347	MP53-D	01/10/89	1153.25
348	MP53-D	11/13/89	1149.60

APPENDIX SW-E
1991 SOURCE INVESTIGATION DATA

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APPENDIX SW-E.1

**SUMMARY OF FIELD OBSERVATIONS AND LABORATORY RESULTS
FOR SOIL SAMPLES COLLECTED DURING 1991**

APPENDIX SW-E.1

**SUMMARY OF FIELD OBSERVATIONS
AND LABORATORY RESULTS FOR
SOIL SAMPLES COLLECTED DURING 1991**

Boring No. (Date)	Sample No.	Depth ^(a) (ft)	PID Reading ^(b)		Reported Concentrations 8010/8020		Soil Description
			Background	Sample	VOC ^(c)	mg/kg	
138SB-1 (5/8/91)	138SB1-1.5	1.5	5	11	ND		Sandy silt
	138SB1-5.5	5.5	5	7.6	NA		Sandy silt
	138SB1-10	10	5	7	NA		Sandy silt
	138SB1-15	15	3	4	NA		Sandy silt
138SB-2 (5/8/91)	138SB2-1.5	1.5	3	5	ND		Sandy silt
	138SB2-2.5	5.5	3	5	ND		Sandy silt
	138SB2-10	10.5	3	5	NA		Silty fine to coarse gravel
	138SB2-15	15.5	3	5	NA		Silty fine to coarse gravel
138SB-3 (5/8/91)	138SB3-1.5	1.5	3	10	ND		Sandy silt
	138SB3-5	5.5	3	7	NA		Sandy silt
	138SB3-10	10.5	3	6	NA		Silty fine to coarse gravel
	138SB3-15	15	3	NR	NR		NR
138SB-4 (5/8/91)	138SB4-1.5	1.5	3	15	TCA	0.07	Sandy silt
	138SB4-5.5	5.5	3	7	NA		Sandy silt
	138SB4-10.5	10.5	3	12	NA		Silty fine to coarse gravel
	138SB4-15	15	3	30	TCA	0.04	Sandy silt
138SB-5 (5/8/91)	138SB5-1.5	1.5	3	25	TCA	0.13	Sandy silt
	138SB5-5.5	5.5	3	40	NA		Silty coarse to fine gravel
	138SB5-10.5	10.5	3	40	TCA	0.07	Gravelly silt
	138SB5-15	15	3	5	NA		Silty coarse to fine gravel
138SB-6 (5/8/91)	138SB6-1.5	1.5	3	25	NA		Sandy silt
	138SB6-5.5	5.5	3	50	TCA	0.07	Sandy silt
	138SB6-10.5	10.5	3	8	NA		Silty coarse to fine gravel
	138SB6-15	15	5	15	NA		Silty coarse to fine gravel
138SB-7 (5/8/91)	138SB7-1.5	1.5	5	45	PCE	0.03	Sandy silt
		5			TCA	0.09	
	10	5	40	TCE	0.03		
	138SB7-5	5	5	40	ND		Sandy silt
	138SB7-10	10	5	15	NA		Silty coarse to fine gravel
138SB-8 (5/9/91)	138SB8-0.3	0.3			PCE	0.49	Sandy silt with fine gravel
					TCA	0.35	
					TCE	0.04	
					X	0.32	
					PCE	0.20	
	138SB8-0.5	0.5			TCA	0.21	Sandy silt with fine gravel

APPENDIX SW-E.1 (Continued)

Boring No. (Date)	Sample No.	Depth ^(a) (ft)	PID Reading ^(b)		Reported Concentrations 8010/8020		Soil Description
			Background	Sample	VOC ^(c)	mg/kg	
AD Sump (12/12/91)	AD-1	1	4.6	>3597 ^(d)	CCLY DCA DCE EB PCE TCA TCA2 TCE VC F-113	0.18 0.54 41 5.6 149 11,700 5.5 0.1 34 47	Silty sand
	AD-2.5	2.5	4.6	^(e)	DCA DCE EB PCE T TCA TCA2 TCE X F-113	0.95 47 120 54 1.3 30,000 4.1 0.38 870 130	Silty sand

- a Depth below ground surface except for AD-1 and AD-2 where depth is below bottom on sump (bottom of sump is about 4 feet below floor in Chemix room of Building A-D).
- b HNu model P101 photoionization detector (PID) equipped with 11.7 ev probe for all samples except AD-1 and AD-2.5 for which a Thermo Environmental Instruments OVM Model 580B equipped with an 11.8 ev bulb.
- c TCA = 1,1,1-trichloroethane; PCE = tetrachloroethylene; TCE = trichloroethylene; CCLY = carbon tetrachloride; DCA = 1,1-dichloroethane; DCE = 1,1-dichloroethylene; TCA2 = 1,1,2-trichloroethane; VC = vinyl chloride; F-113 = trichlorofluoromethane; EB = ethylbenzene; T = toluene; and X = total xylenes.
- d Out of range of PID.
- e PID out of order.

ND = No VOCs detected; NA = Sample not analyzed; and NR = No sample recovered.

APPENDIX SW-E.2

LABORATORY REPORT FOR SOIL SAMPLES COLLECTED 5/8/91 AND 5/9/91



Analytical **Technologies**, Inc.

9830 S. 51st Street Suite B-113 Phoenix, AZ 85044 (602) 496-4400

ATI I.D. M007

May 13, 1991

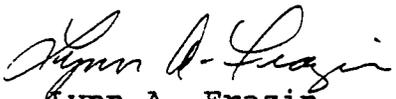
Dames and Moore
7500 N. Dreamy Draw Suite 145
Phoenix, Arizona 85282

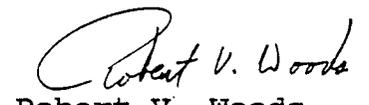
Project Name/Number: SWPL/09448-138-033

Attention: Bill Loughlin

On 05-08-91 & 05-09-91 Analytical Technologies, Inc. Mobile Laboratory analyzed 12 soil sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

If you have any questions or comments, please do not hesitate to contact us at our office (602) 496-4400 or mobile laboratory (602) 377-9496.


Lynn A. Frazin
Mobile Lab Chemist


Robert V. Woods
Laboratory Manager





CLIENT : DAMES AND MOORE
PROJECT # : 09448-138-033
PROJECT NAME : SWPL

DATE RECEIVED : 05-08-91
& 05-09-91
REPORT DATE : 05-13-91

ATI I.D. : M007

ATI #	CLIENT #	TESTS	MATRIX	DATE COLLECTED
M007-01	138SB1-1.5	8010/20	SOIL	05-08-91
M007-05	138SB2-2.0	8010/20	SOIL	05-08-91
M007-09	138SB3-1.5	8010/20	SOIL	05-08-91
M007-13	138SB4-1.5	8010/20	SOIL	05-08-91
M007-16	138SB4-15.5	8010/20	SOIL	05-08-91
M007-17	138SB5-1.5	8010/20	SOIL	05-08-91
M007-19	138SB5-10.5	8010/20	SOIL	05-08-91
M007-22	138SB6-5.5	8010/20	SOIL	05-08-91
M007-25	138SB7-1.5	8010/20	SOIL	05-08-91
M007-26	138SB7-5.0	8010/20	SOIL	05-08-91
M007-28	138SB8-0.3	8010/20	SOIL	05-09-91
M007-29	138SB8-0.5	8010/20	SOIL	05-09-91

-----TOTALS-----

MATRIX
SOIL

SAMPLES
12

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



GAS CHROMATOGRAPHY - RESULTS

ATI I.D.

: M007

TEST : VOLATILE HYDROCARBONS (EPA METHOD 8010/8020)

CLIENT : DAMES AND MOORE
 PROJECT # : 09448-138-033
 PROJECT NAME : SWPL
 SAMPLE MATRIX : SOIL

DATE SAMPLED : 05-08-91
 DATE EXTRACTED : 05-08-91
 DATE ANALYZED : 05-08-91
 UNITS : MG/KG

COMPOUNDS	RESULTS	ATI # CLIENT #	01 138SB1-1.5	05 138SB2-2.0	09 138SB3-1.5
BENZENE			<0.025	<0.025	<0.025
BROMODICHLOROMETHANE			<0.010	<0.010	<0.010
BROMOFORM			<0.010	<0.010	<0.010
BROMOMETHANE			<0.010	<0.010	<0.010
CARBON TETRACHLORIDE			<0.010	<0.010	<0.010
CHLOROBENZENE			<0.025	<0.025	<0.025
CHLOROETHANE			<0.010	<0.010	<0.010
CHLOROFORM			<0.010	<0.010	<0.010
CHLOROMETHANE			<0.010	<0.010	<0.010
DIBROMOCHLOROMETHANE			<0.010	<0.010	<0.010
2-CHLOROETHYL VINYL ETHER			<0.010	<0.010	<0.010
1,3-DICHLOROBENZENE			<0.025	<0.025	<0.025
1,2-DICHLOROBENZENE			<0.025	<0.025	<0.025
1,4-DICHLOROBENZENE			<0.025	<0.025	<0.025
DICHLORODIFLUOROMETHANE			<0.010	<0.010	<0.010
1,1-DICHLOROETHANE			<0.010	<0.010	<0.010
1,2-DICHLOROETHANE			<0.010	<0.010	<0.010
1,1-DICHLOROETHENE			<0.010	<0.010	<0.010
1,2-DICHLOROETHENE			<0.010	<0.010	<0.010
1,2-DICHLOROPROPANE			<0.010	<0.010	<0.010
CIS-1,3-DICHLOROPROPENE			<0.010	<0.010	<0.010
TRANS-1,3-DICHLOROPROPENE			<0.010	<0.010	<0.010
ETHYLBENZENE			<0.025	<0.025	<0.025
METHYLENE CHLORIDE			<0.100	<0.100	<0.100
1,1,2,2-TETRACHLOROETHANE			<0.010	<0.010	<0.010
TETRACHLOROETHENE			<0.010	<0.010	<0.010
TOLUENE			<0.025	<0.025	<0.025
1,1,1-TRICHLOROETHANE			<0.010	<0.010	<0.010
1,1,2-TRICHLOROETHANE			<0.010	<0.010	<0.010
TRICHLOROETHENE			<0.010	<0.010	<0.010
TRICHLOROTRIFLUOROETHANE			<0.100	<0.100	<0.100
VINYL CHLORIDE			<0.010	<0.010	<0.010
TOTAL XYLENES			<0.025	<0.025	<0.025
TRICHLOROFUOROMETHANE			<0.010	<0.010	<0.010
BROMOCHLOROMETHANE (%)			92	93	93
BROMOFUOROBENZENE (%)			119	119	119



GAS CHROMATOGRAPHY - RESULTS

ATI I.D.

: M007

TEST : VOLATILE HYDROCARBONS (EPA METHOD 8010/8020)

CLIENT	: DAMES AND MOORE	DATE SAMPLED	: 05-08-91
PROJECT #	: 09448-138-033	DATE EXTRACTED	: 05-08-91
PROJECT NAME	: SWPL	DATE ANALYZED	: 05-08-91
SAMPLE MATRIX	: SOIL	UNITS	: MG/KG

COMPOUNDS	RESULTS	ATI # CLIENT #	13 138SB4-1.5	16 138SB4-15.5	17 138SB5-1.5
BENZENE			<0.025	<0.025	<0.025
BROMODICHLOROMETHANE			<0.010	<0.010	<0.010
BROMOFORM			<0.010	<0.010	<0.010
BROMOMETHANE			<0.010	<0.010	<0.010
CARBON TETRACHLORIDE			<0.010	<0.010	<0.010
CHLOROBENZENE			<0.025	<0.025	<0.025
CHLOROETHANE			<0.010	<0.010	<0.010
CHLOROFORM			<0.010	<0.010	<0.010
CHLOROMETHANE			<0.010	<0.010	<0.010
DIBROMOCHLOROMETHANE			<0.010	<0.010	<0.010
2-CHLOROETHYL VINYL ETHER			<0.010	<0.010	<0.010
1,3-DICHLOROBENZENE			<0.025	<0.025	<0.025
1,2-DICHLOROBENZENE			<0.025	<0.025	<0.025
1,4-DICHLOROBENZENE			<0.025	<0.025	<0.025
DICHLORODIFLUOROMETHANE			<0.010	<0.010	<0.010
1,1-DICHLOROETHANE			<0.010	<0.010	<0.010
1,2-DICHLOROETHANE			<0.010	<0.010	<0.010
1,1-DICHLOROETHENE			<0.010	<0.010	<0.010
1,2-DICHLOROETHENE			<0.010	<0.010	<0.010
1,2-DICHLOROPROPANE			<0.010	<0.010	<0.010
CIS-1,3-DICHLOROPROPENE			<0.010	<0.010	<0.010
TRANS-1,3-DICHLOROPROPENE			<0.010	<0.010	<0.010
ETHYLBENZENE			<0.025	<0.025	<0.025
METHYLENE CHLORIDE			<0.100	<0.100	<0.100
1,1,2,2-TETRACHLOROETHANE			<0.010	<0.010	<0.010
TETRACHLOROETHENE			<0.010	<0.010	<0.010
TOLUENE			<0.025	<0.025	<0.025
1,1,1-TRICHLOROETHANE			0.07	0.04	0.13
1,1,2-TRICHLOROETHANE			<0.010	<0.010	<0.010
TRICHLOROETHENE			<0.010	<0.010	<0.010
TRICHLOROTRIFLUOROETHANE			<0.100	<0.100	<0.100
VINYL CHLORIDE			<0.010	<0.010	<0.010
TOTAL XYLENES			<0.025	<0.025	<0.025
TRICHLOROFUOROMETHANE			<0.010	<0.010	<0.010
BROMOCHLOROMETHANE (%)			84	88	92
BROMOFUOROENZENE (%)			100	104	115

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : M007

TEST : VOLATILE HYDROCARBONS (EPA METHOD 8010/8020)

CLIENT	: DAMES AND MOORE	DATE SAMPLED	: 05-08-91
PROJECT #	: 09448-138-033	DATE EXTRACTED	: 05-09-91
PROJECT NAME	: SWPL	DATE ANALYZED	: 05-09-91
SAMPLE MATRIX	: SOIL	UNITS	: MG/KG

COMPOUNDS	RESULTS	ATI #	19	22
		CLIENT #	138SB5-10.5	138SB6-5.5
BENZENE			<0.025	<0.025
BROMODICHLOROMETHANE			<0.010	<0.010
BROMOFORM			<0.010	<0.010
BROMOMETHANE			<0.010	<0.010
CARBON TETRACHLORIDE			<0.010	<0.010
CHLOROBENZENE			<0.025	<0.025
CHLOROETHANE			<0.010	<0.010
CHLOROFORM			<0.010	<0.010
CHLOROMETHANE			<0.010	<0.010
DIBROMOCHLOROMETHANE			<0.010	<0.010
2-CHLOROETHYL VINYL ETHER			<0.010	<0.010
1,3-DICHLOROBENZENE			<0.025	<0.025
1,2-DICHLOROBENZENE			<0.025	<0.025
1,4-DICHLOROBENZENE			<0.025	<0.025
DICHLORODIFLUOROMETHANE			<0.010	<0.010
1,1-DICHLOROETHANE			<0.010	<0.010
1,2-DICHLOROETHANE			<0.010	<0.010
1,1-DICHLOROETHENE			<0.010	<0.010
1,2-DICHLOROETHENE			<0.010	<0.010
1,2-DICHLOROPROPANE			<0.010	<0.010
CIS-1,3-DICHLOROPROPENE			<0.010	<0.010
TRANS-1,3-DICHLOROPROPENE			<0.010	<0.010
ETHYLBENZENE			<0.025	<0.025
METHYLENE CHLORIDE			<0.100	<0.100
1,1,2,2-TETRACHLOROETHANE			<0.010	<0.010
TETRACHLOROETHENE			<0.010	<0.010
TOLUENE			<0.025	<0.025
1,1,1-TRICHLOROETHANE			0.09	0.07
1,1,2-TRICHLOROETHANE			<0.010	<0.010
TRICHLOROETHENE			<0.010	<0.010
TRICHLOROTRIFLUOROETHANE			<0.100	<0.100
VINYL CHLORIDE			<0.010	<0.010
TOTAL XYLENES			<0.025	<0.025
TRICHLOROFLUOROMETHANE			<0.010	<0.010
BROMOCHLOROMETHANE (%)			94	83
BROMOFLUOROBENZENE (%)			117	117



GAS CHROMATOGRAPHY - RESULTS

ATI I.D.

: M007

TEST : VOLATILE HYDROCARBONS (EPA METHOD 8010/8020)

CLIENT	: DAMES AND MOORE	DATE SAMPLED	: 05-08-91
PROJECT #	: 09448-138-033	DATE EXTRACTED	: 05-09-91
PROJECT NAME	: SWPL	DATE ANALYZED	: 05-09-91
SAMPLE MATRIX	: SOIL	UNITS	: MG/KG

COMPOUNDS	RESULTS	ATI #	25	26
		CLIENT #	138SB7-1.5	138SB7-5.0
BENZENE			<0.025	<0.025
BROMODICHLOROMETHANE			<0.010	<0.010
BROMOFORM			<0.010	<0.010
BROMOMETHANE			<0.010	<0.010
CARBON TETRACHLORIDE			<0.010	<0.010
CHLOROBENZENE			<0.025	<0.025
CHLOROETHANE			<0.010	<0.010
CHLOROFORM			<0.010	<0.010
CHLOROMETHANE			<0.010	<0.010
DIBROMOCHLOROMETHANE			<0.010	<0.010
2-CHLOROETHYL VINYL ETHER			<0.010	<0.010
1,3-DICHLOROBENZENE			<0.025	<0.025
1,2-DICHLOROBENZENE			<0.025	<0.025
1,4-DICHLOROBENZENE			<0.025	<0.025
DICHLORODIFLUOROMETHANE			<0.010	<0.010
1,1-DICHLOROETHANE			<0.010	<0.010
1,2-DICHLOROETHANE			<0.010	<0.010
1,1-DICHLOROETHENE			<0.010	<0.010
1,2-DICHLOROETHENE			<0.010	<0.010
1,2-DICHLOROPROPANE			<0.010	<0.010
CIS-1,3-DICHLOROPROPENE			<0.010	<0.010
TRANS-1,3-DICHLOROPROPENE			<0.010	<0.010
ETHYLBENZENE			<0.025	<0.025
METHYLENE CHLORIDE			<0.100	<0.100
1,1,2,2-TETRACHLOROETHANE			<0.010	<0.010
TETRACHLOROETHENE			0.03	<0.010
TOLUENE			<0.025	<0.025
1,1,1-TRICHLOROETHANE			0.09	<0.010
1,1,2-TRICHLOROETHANE			<0.010	<0.010
TRICHLOROETHENE			0.03	<0.010
TRICHLOROTRIFLUOROETHANE			<0.100	<0.100
VINYL CHLORIDE			<0.010	<0.010
TOTAL XYLENES			<0.025	<0.025
TRICHLOROFLUOROMETHANE			<0.010	<0.010
BROMOCHLOROMETHANE (%)			87	90
BROMOFLUOROBENZENE (%)			116	115



GAS CHROMATOGRAPHY - RESULTS

ATI I.D.

: M007

TEST : VOLATILE HYDROCARBONS (EPA METHOD 8010/8020)

CLIENT	: DAMES AND MOORE	DATE SAMPLED	: 05-09-91
PROJECT #	: 09448-138-033	DATE EXTRACTED	: 05-09-91
PROJECT NAME	: SWPL	DATE ANALYZED	: 05-09-91
SAMPLE MATRIX	: SOIL	UNITS	: MG/KG

COMPOUNDS	RESULTS	ATI #	28	29
		CLIENT #	138SB8-0.3	138SB8-0.5
BENZENE			<0.025	<0.025
BROMODICHLOROMETHANE			<0.010	<0.010
BROMOFORM			<0.010	<0.010
BROMOMETHANE			<0.010	<0.010
CARBON TETRACHLORIDE			<0.010	<0.010
CHLOROBENZENE			<0.025	<0.025
CHLOROETHANE			<0.010	<0.010
CHLOROFORM			<0.010	<0.010
CHLOROMETHANE			<0.010	<0.010
DIBROMOCHLOROMETHANE			<0.010	<0.010
2-CHLOROETHYL VINYL ETHER			<0.010	<0.010
1,3-DICHLOROBENZENE			<0.025	<0.025
1,2-DICHLOROBENZENE			<0.025	<0.025
1,4-DICHLOROBENZENE			<0.025	<0.025
DICHLORODIFLUOROMETHANE			<0.010	<0.010
1,1-DICHLOROETHANE			<0.010	<0.010
1,2-DICHLOROETHANE			<0.010	<0.010
1,1-DICHLOROETHENE			<0.010	<0.010
1,2-DICHLOROETHENE			<0.010	<0.010
1,2-DICHLOROPROPANE			<0.010	<0.010
CIS-1,3-DICHLOROPROPENE			<0.010	<0.010
TRANS-1,3-DICHLOROPROPENE			<0.010	<0.010
ETHYLBENZENE			<0.025	<0.025
METHYLENE CHLORIDE			<0.100	<0.100
1,1,2,2-TETRACHLOROETHANE			<0.010	<0.010
TETRACHLOROETHENE			0.49	0.20
TOLUENE			<0.025	<0.025
1,1,1-TRICHLOROETHANE			0.35	0.21
1,1,2-TRICHLOROETHANE			<0.010	<0.010
TRICHLOROETHENE			0.04	<0.010
TRICHLOROTRIFLUOROETHANE			<0.100	<0.100
VINYL CHLORIDE			<0.010	<0.010
TOTAL XYLENES			0.32	<0.025
TRICHLOROFLUOROMETHANE			<0.010	<0.010
BROMOCHLOROMETHANE (%)			86	96
BROMOFLUOROBENZENE (%)			115	120

GAS CHROMATOGRAPHY - RESULTS
 REAGENT BLANK

ATI I.D. : M007

TEST : VOLATILE HYDROCARBONS (EPA METHOD 8010/8020)

CLIENT	: DAMES AND MOORE	DATE EXTRACTED	: 05-08-91
PROJECT #	: 09448-138-033	DATE ANALYZED	: 05-08-91
PROJECT NAME	: SWPL	UNITS	: MG/KG

COMPOUNDS	RESULTS	SOIL BLANK	AIR BLANK
BENZENE		<0.025	<0.025
BROMODICHLOROMETHANE		<0.010	<0.010
BROMOFORM		<0.010	<0.010
BROMOMETHANE		<0.010	<0.010
CARBON TETRACHLORIDE		<0.010	<0.010
CHLOROBENZENE		<0.025	<0.025
CHLOROETHANE		<0.010	<0.010
CHLOROFORM		<0.010	<0.010
CHLOROMETHANE		<0.010	<0.010
DIBROMOCHLOROMETHANE		<0.010	<0.010
2-CHLOROETHYL VINYL ETHER		<0.010	<0.010
1,3-DICHLOROBENZENE		<0.025	<0.025
1,2-DICHLOROBENZENE		<0.025	<0.025
1,4-DICHLOROBENZENE		<0.025	<0.025
DICHLORODIFLUOROMETHANE		<0.010	<0.010
1,1-DICHLOROETHANE		<0.010	<0.010
1,2-DICHLOROETHANE		<0.010	<0.010
1,1-DICHLOROETHENE		<0.010	<0.010
1,2-DICHLOROETHENE		<0.010	<0.010
1,2-DICHLOROPROPANE		<0.010	<0.010
CIS-1,3-DICHLOROPROPENE		<0.010	<0.010
TRANS-1,3-DICHLOROPROPENE		<0.010	<0.010
ETHYLBENZENE		<0.025	<0.025
METHYLENE CHLORIDE		<0.100	<0.100
1,1,2,2-TETRACHLOROETHANE		<0.010	<0.010
TETRACHLOROETHENE		<0.010	<0.010
TOLUENE		<0.025	<0.025
1,1,1-TRICHLOROETHANE		<0.010	<0.010
1,1,2-TRICHLOROETHANE		<0.010	<0.010
TRICHLOROETHENE		<0.010	<0.010
TRICHLOROTRIFLUOROETHANE		0.47	0.12
VINYL CHLORIDE		<0.010	<0.010
TOTAL XYLENES		<0.025	<0.025
TRICHLOROFUOROMETHANE		<0.010	<0.010
BROMOCHLOROMETHANE (%)		96	94
BROMOFUOROENZENE (%)		120	113

GAS CHROMATOGRAPHY - RESULTS
REAGENT BLANK

ATI I.D. : M007

TEST : VOLATILE HYDROCARBONS (EPA METHOD 8010/8020)

CLIENT	: DAMES AND MOORE	DATE EXTRACTED	: 05-09-91
PROJECT #	: 09448-138-033	DATE ANALYZED	: 05-09-91
PROJECT NAME	: SWPL	UNITS	: MG/KG

COMPOUNDS	RESULTS	SOIL BLANK
BENZENE		<0.025
BROMODICHLOROMETHANE		<0.010
BROMOFORM		<0.010
BROMOMETHANE		<0.010
CARBON TETRACHLORIDE		<0.010
CHLOROBENZENE		<0.025
CHLOROETHANE		<0.010
CHLOROFORM		<0.010
CHLOROMETHANE		<0.010
DIBROMOCHLOROMETHANE		<0.010
2-CHLOROETHYL VINYL ETHER		<0.010
1,3-DICHLOROBENZENE		<0.025
1,2-DICHLOROBENZENE		<0.025
1,4-DICHLOROBENZENE		<0.025
DICHLORODIFLUOROMETHANE		<0.010
1,1-DICHLOROETHANE		<0.010
1,2-DICHLOROETHANE		<0.010
1,1-DICHLOROETHENE		<0.010
1,2-DICHLOROETHENE		<0.010
1,2-DICHLOROPROPANE		<0.010
CIS-1,3-DICHLOROPROPENE		<0.010
TRANS-1,3-DICHLOROPROPENE		<0.010
ETHYLBENZENE		<0.025
METHYLENE CHLORIDE		0.15
1,1,2,2-TETRACHLOROETHANE		<0.010
TETRACHLOROETHENE		<0.010
TOLUENE		<0.025
1,1,1-TRICHLOROETHANE		<0.010
1,1,2-TRICHLOROETHANE		<0.010
TRICHLOROETHENE		<0.010
TRICHLOROTRIFLUOROETHANE		0.44
VINYL CHLORIDE		<0.010
TOTAL XYLENES		<0.025
TRICHLOROFUOROMETHANE		<0.010
BROMOCHLOROMETHANE (%)		91
BROMOFLUOROBENZENE (%)		119



QUALITY CONTROL DATA

ATI I.D.

: M007

TEST : VOLATILE HYDROCARBONS (EPA METHOD 8010/8020)

CLIENT : DAMES AND MOORE
 PROJECT # : 09448-138-033
 PROJECT NAME : SWPL
 REF I.D. : B3-1.5'/09

DATE EXTRACTED : 05-08-91
 DATE ANALYZED : 05-08-91
 SAMPLE MATRIX : SOIL
 UNITS : MG/KG

COMPOUNDS	SAMPLE RESULTS	CONC. SPIKED	SPIKED SAMPLE	% REC.	DUP. SPIKED SAMPLE	DUP % REC	RPD
BENZENE	<0.025	1.0	0.94	94	1.01	101	7
BROMODICHLOROMETHANE	<0.010	1.0	0.89	89	0.84	84	6
CHLOROBENZENE	<0.025	1.0	1.05	105	0.95	95	10
CHLOROFORM	<0.010	1.0	1.03	103	1.01	101	2
1,1-DICHLOROETHENE	<0.010	1.0	0.93	93	0.86	86	8
TETRACHLOROETHENE	<0.010	1.0	1.05	105	0.97	97	8
TOLUENE	<0.025	1.0	0.95	95	1.00	100	5
1,1,1-TRICHLOROETHANE	<0.010	1.0	1.05	105	0.98	98	7
TRICHLOROETHENE	<0.010	1.0	0.86	86	0.81	81	6
TOTAL XYLENES	<0.025	1.0	0.82	82	0.87	87	6

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Sample Result}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



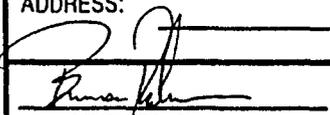
Chain of Custody

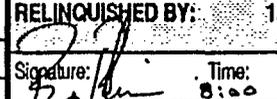
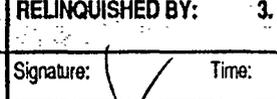
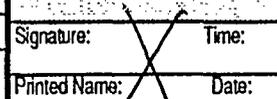
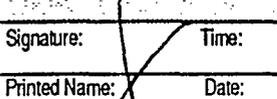
PROJECT MANAGER: <u>Bill Loggala</u> 801-7485					ANALYSIS REQUEST															
COMPANY: <u>DAMES & MOORE</u>					RELINQUISH TIME	HOLD ON COC	EPA 8010/8020	Relinquished To												NUMBER OF CONTAINERS
ADDRESS: <u>7500 N. DEERAY DRIVE SU 145</u>																				
<u>PHOENIX AZ 85020</u>																				
BILL TO: <u>Same</u>																				
COMPANY:																				
ADDRESS:																				
SAMPLERS: (Signature) <u>[Signature]</u>																				
PHONE NUMBER <u>(602) 371-1110</u>																				
MOO7																				
SAMPLE ID	DATE	TIME	MATRIX	LAB ID																
138SB1-1.5	5-8-91	9:45	Soil	01	11:20		X	BK											1	
138SB1-5.5	5-8-91	9:50	↓	02	11:20	X		BK											1	
138SB1-10.0	5-8-91	10:05		03	11:20	X		BK												1
138SB1-15.0	5-8-91	11:40		04	11:20	X		BK												1
138SB2-2.0	5-8-91	11:40		Soil	05	13:42		X	LF											1
138SB2-5.5	5-8-91	11:45	↓	06	13:42	X		LF												1
138SB2-10.5	5-8-91	12:00		07	13:42	X		LF												1
138SB2-15.5	5-8-91	12:30		08	13:42	X		LF												1

PROJECT INFORMATION		SAMPLE RECEIPT		RELINQUISHED BY: 1.		RELINQUISHED BY: 2.		RELINQUISHED BY: 3.	
PROJECT NUMBER: <u>09448-138-033</u>		TOTAL NUMBER OF CONTAINERS: <u>8</u>		Signature: <u>[Signature]</u> Time: <u>8:00</u>		Signature: <u>[Signature]</u> Time:		Signature: <u>[Signature]</u> Time:	
PROJECT NAME: <u>SWPL</u>		CHAIN OF CUSTODY SEALS: <u>-</u>		Printed Name: <u>Bill Loggala</u> Date: <u>5-9-91</u>		Printed Name: <u>[Signature]</u> Date:		Printed Name: <u>[Signature]</u> Date:	
PURCHASE ORDER NUMBER:		INTACT?: <u>-</u>		Company: <u>Dames & Moore</u>		Company: <u>[Signature]</u>		Company: <u>[Signature]</u>	
VIA:		RECEIVED GOOD COND./COLD: <u>Y</u>		RECEIVED BY: 1.		RECEIVED BY: 2.		RECEIVED BY: (LAB) 3.	
TAT: <input type="checkbox"/> 24 HRS <input type="checkbox"/> 48 HRS <input type="checkbox"/> 1 WK <input type="checkbox"/> 2 WKS		LAB NUMBER: <u>MOO7</u>		Signature: <u>[Signature]</u> Time:		Signature: <u>[Signature]</u> Time:		Signature: <u>[Signature]</u> Time: <u>8:00</u>	
SAMPLE DISPOSAL INSTRUCTIONS				Printed Name: <u>[Signature]</u> Date:		Printed Name: <u>[Signature]</u> Date:		Printed Name: <u>B. Rivett</u> Date: <u>5-9-91</u>	
<input type="checkbox"/> ATI Disposal @ \$5.00 each <input type="checkbox"/> Return <input type="checkbox"/> Pickup (will call)				Company: <u>[Signature]</u>		Company: <u>[Signature]</u>		Analytical Technologies, Inc.	
Comments:									



Chain of Custody

PROJECT MANAGER: <u>BILL LOUGHLIN</u>					ANALYSIS REQUEST																			
COMPANY: <u>DANES & MOORE</u>					RELINQUISHED TIME	HOLD ON COC	EPA 8010/8020	RELINQUISHED TO:																
ADDRESS: <u>7500 N. DREAMY DRAW DR. SU 145</u>																								
<u>PHOENIX, AZ 85020</u>																								
BILL TO: <u>SAME</u>																								
COMPANY: _____																								
ADDRESS: _____																								
 SAMPLERS: (Signature) _____ PHONE NUMBER <u>(602) 371-1710</u>																								
M007-																								
SAMPLE ID	DATE	TIME	MATRIX	LAB ID																				
<u>138SB3-1.5</u>	<u>5-8-91</u>	<u>13:30</u>	<u>Soil</u>	<u>09</u>					<u>13:42</u>		<u>X</u>	<u>LF</u>												<u>1</u>
<u>138SB3-5.5</u>	<u>5-8-91</u>	<u>13:50</u>	<u>Soil</u>	<u>10</u>	<u>14:30</u>	<u>X</u>		<u>BK</u>												<u>1</u>				
<u>138SB3-10.5</u>	<u>5-8-91</u>	<u>14:10</u>	<u>Soil</u>	<u>11</u>		<u>X</u>		<u>BK</u>												<u>1</u>				
<u>138SB3-15</u>	<u>5-8-91</u>	<u>14:55</u>	<u>Soil</u>	<u>12</u>		<u>X</u>		<u>BK</u>												<u>1</u>				
<u>138SB4-1.5</u>	<u>5-8-91</u>	<u>15:20^{BK}</u>	<u>Soil</u>	<u>13</u>		<u>X</u>	<u>X</u>	<u>BK</u>												<u>1</u>				
<u>138SB4-5.5</u>	<u>5-8-91</u>	<u>15:25^{BK}</u>	<u>Soil</u>	<u>14</u>		<u>X</u>		<u>BK</u>												<u>1</u>				
<u>138SB4-10.5</u>	<u>5-8-91</u>	<u>15:45</u>	<u>Soil</u>	<u>15</u>		<u>X</u>		<u>BK</u>												<u>1</u>				
<u>138SB4-15.5</u>	<u>5-8-91</u>	<u>16:00</u>	<u>Soil</u>	<u>16</u>	<u>15:20</u>		<u>X</u>	<u>BK</u>												<u>1</u>				
<u>138SB5-1.5</u>	<u>5-8-91</u>	<u>16:50</u>	<u>Soil</u>	<u>17</u>	<u>15:20</u>		<u>X</u>	<u>BK BK</u>												<u>1</u>				

PROJECT INFORMATION		SAMPLE RECEIPT		RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
PROJECT NUMBER: <u>09448-138-033</u>	TOTAL NUMBER OF CONTAINERS: <u>9</u>	CHAIN OF CUSTODY SEALS: <u>-</u>	INTACT?: <u>-</u>	Signature: 	Signature: 	Signature: 
PROJECT NAME: <u>SWPL</u>	RECEIVED GOOD COND./COLD: <u>Y</u>	LAB NUMBER: <u>M007</u>		Time: <u>8:00</u>	Time: _____	Time: _____
PURCHASE ORDER NUMBER: _____				Printed Name: <u>Bruce A. Robinson</u>	Printed Name: _____	Printed Name: _____
VIA: _____				Date: <u>5-9-91</u>	Date: _____	Date: _____
TAT: <input type="checkbox"/> 24 HRS <input type="checkbox"/> 48 HRS <input type="checkbox"/> 1 WK <input type="checkbox"/> 2 WKS				Company: <u>DANES & MOORE</u>	Company: _____	Company: _____
SAMPLE DISPOSAL INSTRUCTIONS				RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: (LAB) 3.
<input type="checkbox"/> ATI Disposal @ \$5.00 each <input type="checkbox"/> Return <input type="checkbox"/> Pickup (will call)				Signature: 	Signature: 	Signature: <u>B. Kinard</u>
Comments: _____				Time: _____	Time: _____	Time: <u>5:29</u>
				Printed Name: _____	Printed Name: _____	Printed Name: <u>B. Kinard</u>
				Date: _____	Date: _____	Date: <u>5-9-91</u>
				Company: _____	Company: _____	Company: <u>Analytical Technologies, Inc.</u>



Analytical Technologies, Inc.

Phoenix, Arizona

Chain of Custody

DATE 5/8/91 PAGE 3 OF 4

PROJECT MANAGER: <u>Bill Loughlin</u>					ANALYSIS REQUEST																						
COMPANY: <u>Daniel & Moore</u>					Relinquished Time	Hold on CUC	EPA 8010/8020	Relinquished To																NUMBER OF CONTAINERS			
ADDRESS: <u>7500 N Dreamy Denee St 1415</u>																											
<u>Phoenix AZ 85020</u>																											
BILL TO: <u>SAME</u>																											
COMPANY:																											
ADDRESS:																											
 SAMPLERS: (Signature) PHONE NUMBER <u>(602) 371-1510</u>																											
SAMPLE ID	DATE	TIME	MATRIX	LAB ID																							
<u>1385B5-5.5</u>	<u>5-8-91</u>	<u>17:05</u>	<u>Soil</u>	<u>18</u>					<u>745</u>	<u>X</u>	<u>OK</u>	<u>BK</u>															1
<u>1385B5-10.5</u>	<u>5-8-91</u>	<u>17:20</u>	<u>Soil</u>	<u>19</u>					<u>745</u>	<u>•</u>	<u>X</u>	<u>BK</u>	<u>5/9/91</u>														1
<u>1385B5-15</u>	<u>5-8-91</u>	<u>17:45</u>	<u>Soil</u>	<u>20</u>	<u>745</u>	<u>X</u>	<u>•</u>	<u>BK</u>	<u>5/9/91</u>													1					
<u>1385B6-1.5</u>	<u>5-8-91</u>	<u>18:20</u>	<u>Soil</u>	<u>21</u>	<u>745</u>	<u>X</u>	<u>•</u>	<u>BK</u>	<u>5/9/91</u>													1					
<u>1385B6-5.5</u>	<u>5-8-91</u>	<u>18:30</u>	<u>Soil</u>	<u>22</u>	<u>745</u>	<u>•</u>	<u>X</u>	<u>BK</u>	<u>5/9/91</u>													1					
<u>1385B6-10.5</u>	<u>5-8-91</u>	<u>18:40</u>	<u>Soil</u>	<u>23</u>	<u>745</u>	<u>X</u>	<u>•</u>	<u>BK</u>	<u>5/9/91</u>													1					
<u>1385B6-15</u>	<u>5-8-91</u>	<u>19:00</u>	<u>Soil</u>	<u>24</u>	<u>745</u>	<u>X</u>	<u>•</u>	<u>BK</u>	<u>5/9/91</u>													1					
<u>1385B7-5.0</u>	<u>5-8-91</u>	<u>19:30</u>	<u>Soil</u>	<u>25</u>	<u>745</u>	<u>•</u>	<u>X</u>	<u>BK</u>	<u>5/9/91</u>													1					
<u>1385B7-15</u>	<u>5-8-91</u>	<u>19:20</u>	<u>Soil</u>	<u>25</u>	<u>745</u>	<u>•</u>	<u>X</u>	<u>BK</u>	<u>5/9/91</u>													1					

PROJECT INFORMATION			SAMPLE RECEIPT			RELINQUISHED BY: 1.		RELINQUISHED BY: 2.		RELINQUISHED BY: 3.	
PROJECT NUMBER: <u>09448-138-033</u>			TOTAL NUMBER OF CONTAINERS: <u>9</u>		Signature:		Signature:		Signature:		
PROJECT NAME: <u>SL PL</u>			CHAIN OF CUSTODY SEALS: <u>-</u>		Time: <u>8:00</u>		Time: <u>•</u>		Time: <u>•</u>		
PURCHASE ORDER NUMBER:			INTACT?: <u>-</u>		Printed Name: <u>Bill Loughlin</u>		Printed Name: <u>•</u>		Printed Name: <u>•</u>		
VIA:			RECEIVED GOOD COND./COLD: <u>Y</u>		Date: <u>5-9-91</u>		Date: <u>•</u>		Date: <u>•</u>		
TAT: <input type="checkbox"/> 24 HRS <input type="checkbox"/> 48 HRS <input type="checkbox"/> 1 WK <input type="checkbox"/> 2 WKS			LAB NUMBER: <u>M007</u>		Company: <u>Daniel & Moore</u>		Company: <u>•</u>		Company: <u>•</u>		
SAMPLE DISPOSAL INSTRUCTIONS						RECEIVED BY: 1.		RECEIVED BY: 2.		RECEIVED BY: (LAB) 3.	
<input type="checkbox"/> ATI Disposal @ \$5.00 each <input type="checkbox"/> Return <input type="checkbox"/> Pickup (will call)						Signature:		Signature:		Signature: <u>Bill Loughlin</u>	
Comments:						Time: <u>•</u>		Time: <u>•</u>		Time: <u>8</u>	
						Printed Name: <u>•</u>		Printed Name: <u>•</u>		Printed Name: <u>Bill Loughlin</u>	
						Date: <u>•</u>		Date: <u>•</u>		Date: <u>5-9-91</u>	
						Company: <u>•</u>		Company: <u>•</u>		Company: <u>Analytical Technologies, Inc.</u>	



Analytical Technologies, Inc.

Phoenix, Arizona

Chain of Custody

DATE 5/8/91 PAGE 4 OF 4

PROJECT MANAGER: <u>Bill Loughlin</u>	ANALYSIS REQUEST												
COMPANY: <u>Dames and Moore</u>	Relinquish. Time	Hold on CCK	EPA 8010/8020	Relinquished To									NUMBER OF CONTAINERS
ADDRESS: <u>7500 N Dreamy Draw #1415</u>													
<u>Phoenix AZ 85020</u>													
BILL TO: <u>SAME</u>													
COMPANY: _____													
ADDRESS: _____													

SAMPLERS: (Signature) [Signature] PHONE NUMBER (602) 371-1510
M007

SAMPLE ID	DATE	TIME	MATRIX	LAB ID										
138SB7-10	5/8/91	19:45	Sol	27	7:45	X		BK	5/9/91					
138SB8-.3	5-9-91	9:10	Sol	28	9:30		X							
138SB8-.5	5-9-91	9:20	Sol	29	9:30		X							

PROJECT INFORMATION		SAMPLE RECEIPT		RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
PROJECT NUMBER: <u>09448-138-033</u>	TOTAL NUMBER OF CONTAINERS: <u>—</u>	CHAIN OF CUSTODY SEALS: <u>—</u>	INTACT?: <u>—</u>	Signature: <u>[Signature]</u> Time: <u>8:00</u>	Signature: _____ Time: _____	Signature: _____ Time: _____
PROJECT NAME: <u>SWPL</u>	RECEIVED GOOD COND./COLD: <u>Y</u>	LAB NUMBER: <u>M007</u>		Printed Name: <u>Bruce A. Robinson</u> Date: <u>5-9-91</u>	Printed Name: _____ Date: _____	Printed Name: _____ Date: _____
PURCHASE ORDER NUMBER: _____				Company: <u>DAMES & MOORE</u>	Company: _____	Company: _____
VIA: _____				RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: (LAB) 3.
TAT: <input type="checkbox"/> 24 HRS <input type="checkbox"/> 48 HRS <input type="checkbox"/> 1 WK <input type="checkbox"/> 2 WKS				Signature: _____ Time: _____	Signature: _____ Time: _____	Signature: <u>[Signature]</u> Time: <u>6:00</u>
SAMPLE DISPOSAL INSTRUCTIONS				Printed Name: _____ Date: _____	Printed Name: _____ Date: _____	Printed Name: <u>B. Kirschke</u> Date: <u>5-9-91</u>
<input type="checkbox"/> ATI Disposal @ \$5.00 each <input type="checkbox"/> Return <input type="checkbox"/> Pickup (will call)				Company: _____	Company: _____	Analytical Technologies, Inc.
Comments: _____						

APPENDIX SW-E.3

LABORATORY REPORT FOR SOIL SAMPLES COLLECTED 12/12/91

SW-E-4



Analytical **Technologies**, Inc.

9830 S. 51st Street Suite B-113 Phoenix, AZ 85044 (602) 496-4400



ATI I.D. 112742

December 19, 1991

Dames & Moore
7500 N. Dreamy Draw Drive
Suite 145
Phoenix, AZ 85020

Project Name/Number: A-D Bldg/09448-158-033

Attention: Berkley Hudson

On 12/12/91, Analytical Technologies, Inc. received a request to analyze soil sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

E indicates compound is an estimated value detected outside of the method linear range. D1 and D2 indicate the compounds were analyzed at a greater dilution.

Enclosed results are on a dry weight basis.

If you have any questions or comments, please do not hesitate to contact us at (602)438-1530.

Elizabeth Proffitt
Senior Project Manager

Robert V. Woods
Laboratory Manager

RVW:clf
Enclosure



Analytical Technologies, Inc.

CLIENT : DAMES & MOORE, PHOENIX
PROJECT # : 09448-158-033
PROJECT NAME : A-D BLDG

DATE RECEIVED : 12/12/91
REPORT DATE : 12/19/91

ATI I.D. : 112742

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	AD-1	SOIL	12/12/91
02	AD-2.5	SOIL	12/12/91
03	AD-3.0 (HOLD)	SOIL	12/12/91
04	AD-2.0 (HOLD)	SOIL	12/12/91

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	4

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



Analytical **Technologies**, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 112742

CLIENT : DAMES & MOORE, PHOENIX
PROJECT # : 09448-158-033
PROJECT NAME : A-D BLDG

DATE RECEIVED : 12/12/91

REPORT DATE : 12/19/91

PARAMETER	UNITS	01	02
% MOISTURE	%	5.9	6.7



Analytical **Technologies**, Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : DAMES & MOORE, PHOENIX
PROJECT # : 09448-158-033
PROJECT NAME : A-D BLDG

ATI I.D. : 112742

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
MOISTURE (%)		11299915	8.7	8.8	1	NA	NA	NA

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11274201

TEST : VOLATILE HALOCARBON/AROMATIC (EPA 8010/8020)

CLIENT	: DAMES & MOORE, PHOENIX	DATE SAMPLED	: 12/12/91
PROJECT #	: 09448-158-033	DATE RECEIVED	: 12/12/91
PROJECT NAME	: A-D BLDG	DATE EXTRACTED	: 12/12/91
CLIENT I.D.	: AD-1	DATE ANALYZED	: 12/12/91
SAMPLE MATRIX	: SOIL	UNITS	: MG/KG
		DILUTION FACTOR	: 10

COMPOUNDS	RESULTS
BENZENE	<0.250
BROMODICHLOROMETHANE	<0.100
BROMOFORM	<0.100
BROMOMETHANE	<0.100
CARBON TETRACHLORIDE	<0.100
CHLOROETHANE	0.18
CHLOROETHANE	<0.100
CHLOROFORM	<0.100
CHLOROMETHANE	<0.100
DIBROMOCHLOROMETHANE	<0.100
2-CHLOROETHYL VINYL ETHER	<0.250
1,3-DICHLOROETHANE	<0.250
1,2 & 1,4-DICHLOROETHANE	<0.250
DICHLORODIFLUOROMETHANE	<0.100
1,1-DICHLOROETHANE	0.54
1,2-DICHLOROETHANE	<0.100
1,1-DICHLOROETHENE	41 E
1,2-DICHLOROETHENE (TOTAL)	<0.100
1,2-DICHLOROPROPANE	<0.100
CIS-1,3-DICHLOROPROPENE	<0.100
TRANS-1,3-DICHLOROPROPENE	<0.100
ETHYLBENZENE	5.6
METHYLENE CHLORIDE	<1.000
1,1,2,2-TETRACHLOROETHANE	<0.100
TETRACHLOROETHENE	149 D1
TOLUENE	<0.250
1,1,1-TRICHLOROETHANE	11700 D2
1,1,2-TRICHLOROETHANE	5.5
TRICHLOROETHENE	0.1
TRICHLOROTRIFLUOROETHANE	<1.0
VINYL CHLORIDE	<0.010
TOTAL XYLENES	34
TRICHLOROFLUOROMETHANE	47 E

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	91
BROMOFLUOROBENZENE (%)	95

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11274202

TEST : VOLATILE HALOCARBON/AROMATIC (EPA 8010/8020)

CLIENT	: DAMES & MOORE, PHOENIX	DATE SAMPLED	: 12/12/91
PROJECT #	: 09448-158-033	DATE RECEIVED	: 12/12/91
PROJECT NAME	: A-D BLDG	DATE EXTRACTED	: 12/12/91
CLIENT I.D.	: AD-2.5	DATE ANALYZED	: 12/12/91
SAMPLE MATRIX	: SOIL	UNITS	: MG/KG
		DILUTION FACTOR	: 10

COMPOUNDS	RESULTS
BENZENE	<0.250
BROMODICHLOROMETHANE	<0.100
BROMOFORM	<0.100
BROMOMETHANE	<0.100
CARBON TETRACHLORIDE	<0.100
CHLORO BENZENE	<0.250
CHLOROETHANE	<0.100
CHLOROFORM	<0.100
CHLOROMETHANE	<0.100
DIBROMOCHLOROMETHANE	<0.100
2-CHLOROETHYL VINYL ETHER	<0.250
1,3-DICHLORO BENZENE	<0.250
1,2 & 1,4-DICHLORO BENZENE	<0.250
DICHLORODIFLUOROMETHANE	<0.100
1,1-DICHLOROETHANE	0.95
1,2-DICHLOROETHANE	<0.100
1,1-DICHLOROETHENE	47 E
1,2-DICHLOROETHENE (TOTAL)	<0.100
1,2-DICHLOROPROPANE	<0.100
CIS-1,3-DICHLOROPROPENE	<0.100
TRANS-1,3-DICHLOROPROPENE	<0.100
ETHYLBENZENE	120 D1
METHYLENE CHLORIDE	<1.000
1,1,2,2-TETRACHLOROETHANE	<0.100
TETRACHLOROETHENE	54 D1
TOLUENE	1.3
1,1,1-TRICHLOROETHANE	30000 D2
1,1,2-TRICHLOROETHANE	4.1
TRICHLOROETHENE	0.38
TRICHLOROTRIFLUOROETHANE	<1.0
VINYL CHLORIDE	<0.100
TOTAL XYLENES	870 D1
TRICHLOROFLUOROMETHANE	130 D1

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	95
BROMOFLUOROBENZENE (%)	86



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBON/AROMATIC (EPA 8010/8020)

CLIENT	: DAMES & MOORE, PHOENIX	ATI I.D.	: 112742
PROJECT #	: 09448-158-033	DATE EXTRACTED	: 12/12/91
PROJECT NAME	: A-D BLDG	DATE ANALYZED	: 12/12/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: MG/KG
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
BENZENE	<0.025
BROMODICHLOROMETHANE	<0.010
BROMOFORM	<0.010
BROMOMETHANE	<0.010
CARBON TETRACHLORIDE	<0.010
CHLOROETHANE	<0.010
CHLOROBENZENE	<0.025
CHLOROFORM	<0.010
CHLOROMETHANE	<0.010
DIBROMOCHLOROMETHANE	<0.010
2-CHLOROETHYL VINYL ETHER	<0.025
1,3-DICHLOROETHANE	<0.010
1,2 & 1,4-DICHLOROETHANE	<0.025
DICHLORODIFLUOROMETHANE	<0.010
1,1-DICHLOROETHANE	<0.010
1,2-DICHLOROETHANE	<0.010
1,1-DICHLOROETHENE	<0.010
1,2-DICHLOROETHENE (TOTAL)	<0.010
1,2-DICHLOROPROPANE	<0.010
CIS-1,3-DICHLOROPROPENE	<0.010
TRANS-1,3-DICHLOROPROPENE	<0.010
ETHYLBENZENE	<0.025
METHYLENE CHLORIDE	<0.100
1,1,2,2-TETRACHLOROETHANE	<0.010
TETRACHLOROETHENE	<0.010
TOLUENE	<0.025
1,1,1-TRICHLOROETHANE	<0.010
1,1,2-TRICHLOROETHANE	<0.010
TRICHLOROETHENE	<0.010
TRICHLOROTRIFLUOROETHANE	<0.10
VINYL CHLORIDE	<0.010
TOTAL XYLENES	<0.025
TRICHLOROFLUOROMETHANE	<0.01

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	87
BROMOFLUOROBENZENE (%)	80

QUALITY CONTROL DATA

ATI I.D. : 112742

TEST : VOLATILE HALOCARBON/AROMATIC (EPA 8010/8020)

 CLIENT : DAMES & MOORE, PHOENIX
 PROJECT # : 09448-158-033
 PROJECT NAME : A-D BLDG
 REF I.D. : 11299918

 DATE ANALYZED : 12/14/91
 SAMPLE MATRIX : NON-AQUEOUS
 UNITS : MG/KG

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP. SPIKED		RPD
	RESULT	SPIKED			SAMPLE	REC.	
1,1-DICHLOROETHENE	<0.01	1.0	0.91	91	0.93	93	2
TRICHLOROETHENE	<0.01	1.0	0.98	98	0.97	97	1
TETRACHLOROETHENE	<0.01	1.0	1.08	108	1.00	100	8
BENZENE	<0.025	1.0	0.81	81	0.80	80	1
BROMODICHLOROMETHANE	<0.01	1.0	0.97	97	1.00	100	3
CHLOROFORM	<0.01	1.0	1.10	110	1.07	107	3
1,1,1-TRICHLOROETHANE	<0.01	1.0	1.07	107	1.09	109	2
TOLUENE	<0.025	1.0	0.95	95	0.92	92	3
CHLOROBENZENE	<0.025	1.0	1.07	107	1.04	104	3
M-XYLENE	<0.025	1.0	0.90	90	0.85	85	6

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



Analytical Technologies, Inc.

Phoenix, Arizona

Chain of Custody

DATE 12-12 PAGE 1 OF 1

SEND RESULTS TO BRUCE ROBINSON

PROJECT MANAGER: BRUCE ROBINSON

COMPANY: DAMES & MOORE

ADDRESS: 7500 Quince Drive Dr
Suite 145 Phoenix AZ 85022

BILL TO:

COMPANY: Same

ADDRESS:

ANALYSIS REQUEST

SAMPLERS: (Signature) [Signature] PHONE NUMBER (602) 371-1110

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Petroleum Hydrocarbons (418.1)	Hold	(MOD 8015) Gas/Diesel	Diesel/Gasoline/BTXE (MOD 8015/8020)	BTXE (8020) MOD	Chlorinated Hydrocarbons (601/8010)	Aromatic Hydrocarbons (602/8020)	MTBE	Pesticides/PCB (608/8080)	Herbicides (615/8150)	Base/Neutral/Acid Compounds GC/MS (625/8270)	Volatile Organics GC/MS (624/8240)	* Moisture Residue	SDWA Primary Standards	SDWA Secondary Standards	SDWA Volatiles (502.1/503.1)	The 13 Priority Pollutant Metals	The 8 EP Tox Metals by EP Tox Prep. (1310)	The 8 EP Tox Metals by Total Digestion	The 8 EP Tox Metals by TCLP (1311)	NUMBER OF CONTAINERS
AD-1	12-12-91	1215	Soil	1				X	X	X							X								1
AD-2.5	"	1420	"	2				X	X	X							X								1
AD-3.0 (HOLD)	"	1450	"	3	X																				1
AD-2.0 (HOLD)	"	1350	"	4	X																				1
			"																						

PROJECT INFORMATION		SAMPLE RECEIPT		RELINQUISHED BY: 1.		RELINQUISHED BY: 2.		RELINQUISHED BY: 3.	
PROJECT NO: <u>C-998-158-022</u>	TOTAL NO. OF CONTAINERS: <u>4</u>	PROJECT NAME: <u>A-D BLDG</u>	CHAIN OF CUSTODY SEALS: <u>Y</u>	Signature: <u>[Signature]</u>	Time: <u>15:30</u>	Signature: <u>[Signature]</u>	Time: <u>17:00</u>	Signature:	Time:
P.O. NO.	INTACT?: <u>Y</u>	SHIPPED VIA:	RECEIVED GOOD COND./COLD: <u>Y</u>	Printed Name: <u>Robert Guebe</u>	Date: <u>12-12-91</u>	Printed Name: <u>Bruce A. Robinson</u>	Date: <u>12-12-91</u>	Printed Name:	Date:
SAMPLE DISPOSAL INSTRUCTIONS	LAB NUMBER: <u>112742</u>	Company: <u>DAMES & MOORE</u>	Company: <u>DAMES & MOORE</u>	Company:	Company:	Company:	Company:	Company:	Company:
<input checked="" type="checkbox"/> ATI <input type="checkbox"/> RETURN	PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS	RECEIVED BY: 1.		RECEIVED BY: 2.		RECEIVED BY: (LAB) 3.			
TAT: (NORMAL) <input type="checkbox"/> (RUSH) <input checked="" type="checkbox"/> 24 <input type="checkbox"/> 48 <input type="checkbox"/> 72 <input type="checkbox"/> 1 WEEK	Comments: <u>* MOISTURE % RUSH PER BP</u> <u>DON'T NEED TO BE 24 HR RUSH</u>	Signature: <u>[Signature]</u>	Time: <u>15:30</u>	Signature: <u>[Signature]</u>	Time:	Signature: <u>[Signature]</u>	Time: <u>9:00</u>	Signature:	Time:
		Printed Name: <u>Bruce A. Robinson</u>	Date: <u>12-12-91</u>	Printed Name:	Date:	Printed Name: <u>MARGUERITE DEISCOLL</u>	Date:	Printed Name:	Date:
		Company: <u>DAMES & MOORE</u>	Company:	Company:	Company:	Analytical Technologies, Inc.			
						<u>12/12/91</u>			

APPENDIX SW-E.4

**HYDROGEOCHEM INC. REPORT FOR SOIL-GAS SAMPLES COLLECTED
3/25/91 AND 3/26/91**

SOIL GAS SURVEY
OF
MOTOROLA SWLP

Submitted to

Dames & Moore
7500 N. Dreamy Draw Drive
Suite 145
Phoenix, AZ 85020

Submitted by

Hydro Geo Chem, Inc.
1430 North Sixth Avenue
Tucson, Arizona 85705

April 10, 1991

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QUALITY ASSURANCE/QUALITY CONTROL.....	6
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3. PCE concentrations
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SOIL GAS SURVEY OF MOTOROLA SWLP

INTRODUCTION

This report presents the methods and results of a soil gas investigation for volatile organic compounds performed March 25 and 26, 1991 at Motorola SWLP in Phoenix, Arizona. The investigation was conducted by Hydro Geo Chem, Inc. under contract to Dames & Moore. The soil gas investigation was designed to evaluate the near surface distribution of chlorinated hydrocarbons on the site.

BACKGROUND & THEORY

Soil gas surveys consist of the sampling and analysis of the soil gases that reside in the pore space of the unsaturated zone above the water table. Because many common organic compounds and industrial solvents exhibit significant vapor pressures and are relatively insoluble in water, their introduction into subsurface soils results in vapor phase permeation and transport. Should these chemicals reach the water table and travel with the groundwater, vapors will continue to emanate from the contaminated groundwater into overlying soil. Thus organic contamination of the subsurface or groundwater can be detected by measuring the concentration of volatile organics in the soil gas.

The concentration of a volatile organic compound (VOC) in soil gas is a complex function of the distribution of the organic compound and its interaction with the soil. This interaction depends on a number of soil parameters including soil particle size and mineralogy, the soil's natural and anthropogenic organic content, soil moisture, temperature, lithology, and heterogeneity.

Whatever the source of the VOC in soil gas, its concentration is representative of soils contamination at the point of measurement. Volatile organic contaminants are present in the gas phase in unsaturated pore spaces, in the water contained in the unsaturated soils, and sorbed on the soil particles. The total soils concentration is the sum of the VOC's contained in the three phases. The partitioning of the VOC between gas, liquid and solid phases is dependent on both the soil properties and the chemical properties of the organic compound. Thus, given the chemical properties of the VOC and measurements or reasonable estimates of relevant soil parameters, soil-gas data can be used to provide semi-quantitative estimates of soil contamination.

Since equilibrium between phases is generally rapid compared to the rate of gaseous diffusion, soil gas concentrations can be used to estimate the total soil concentration. The major uncertainties in estimating soil concentration directly from soil gas concentrations are the organic and moisture content of the soils. Chemical properties of particular organic compounds are well known, (i.e., vapor pressure, solubility), and the other relevant soil parameters (i.e., bulk density, porosity) have relatively little effect on soil concentration estimates. The following equation relates soil gas concentrations to total soil concentrations.

$$\frac{C_g}{C_T} = \left[\frac{K_D \rho_b}{H_D} + \frac{\theta_w}{H_D} + (\theta_T - \theta_w) \right]^{-1}$$

- Where C_g is the concentration in the gas [M/V air]
 C_T is the concentration in the soil [M/V bulk volume soil]
 K_D is the water-solid distribution coefficient [M/M solid/M/V water]
 ρ_b is the bulk soil density [M/V solid]
 H_D is the gas-water distribution coefficient [M/V air/M/V water]
 θ_w is the water filled porosity
 θ_T is the total porosity

The gas-water distribution coefficient (dimensionless Henry's law constant) is

$$H_D = C_g/C_w = H/RT = \rho_g/S$$

- where ρ_g is the saturated vapor density [M/V]
and S is the solubility [M/V].
 H is the Henry's coefficient
 R is the gas constant
 T is the temperature in degrees Kelvin

The water-solid distribution coefficient is approximately

$$K_D = \frac{C_s}{C_w} = \frac{K_{oc} \cdot \%OC}{100}$$

- where C_s is the concentration in the solid (mg/gm)
 C_w is the concentration in the water (mg/ml)
 K_{oc} is the water-organic carbon distribution coefficient
 $\%OC$ is the percent organic carbon in the soil

Use of soil gas to infer concentrations of sources at distance (such as groundwater plumes) is necessarily much more qualitative. Soil gas data used in this manner is limited by the lack of information regarding the soil parameters interposed between the source and sampling point. It is therefore generally not possible to make quantitative estimates of groundwater concentrations from soil gas samples collected at distance from the saturated interface. Away from source areas (ie. underground storage tanks, surface spills etc.) where only the groundwater is providing a significant soil gas concentration, soil gas is often an excellent relative indicator of groundwater contamination. The effectiveness of soil gas surveys to delineate groundwater contamination, is, however, dependent on the depth to groundwater, contaminant concentration in the groundwater, and distribution of air permeabilities in the unsaturated zone.

SCOPE OF WORK

Soil gas samples were collected from 23 locations on the investigation site. Sampling locations were determined by a Dames & Moore on-site representative. The sampling locations are shown in Figure 1.

The volatile organic compounds that were analyzed at each of the sampling locations included the chlorinated hydrocarbons:

Tetrachloroethene (PCE)

Trichloroethene (TCE)

1,1 - Dichloroethene (1,1 - DCE)

Chloroethene (Vinyl Chloride)

1,1,1 - Trichloroethane (1,1,1 - TCA)

1,1,2 - Trifluoro 1,2,2 - Trichloroethane (Freon 113)

METHODS AND INSTRUMENTATION

Sampling probes consisted of 1 3/8" OD, EW drill rod tipped by a loosely held hardened-steel disposable point. A probe was driven into the ground at each sampling location to a depth of 5.0 feet below land surface using a flatbed truck-mounted hydraulically-actuated drive point rig. The probe was then pulled up 6 inches to expose the sampling interval. A regulated vacuum pump was attached to the probe via a stainless steel adaptor. Three to five times the dead volume of the sampling train was purged to ensure that a representative soil gas sample would be collected. The samples were collected by withdrawing the soil gas from the probe using a Hydro Geo Chem designed, computerized mass-flow controller to regulate flow and measure volume sampled. The volatile organics were trapped and concentrated in a glass cartridge contained in a stainless steel housing. The concentrating cartridge was packed with three activated carbons, Carbotrap, Carbopak-B, and Carbosieve S-III, selected to quantitatively trap organics with widely different volatilities. After sampling, the cartridges were brought to the on-site mobile laboratory for analysis.

Gas chromatographic techniques were used to identify and measure concentrations of the various compounds. The soil gas cartridges were desorbed at a temperature of 360 °C using a thermal desorption unit. Samples were injected by the desorber into a gas chromatograph equipped with a megabore capillary column and a photoionization (PID) and Hall conductivity detector.

The make and model of the equipment used to perform these on-site analyses included:

Envirochem 850 Thermal Tube Desorber

Varian 3400 Gas Chromatograph
Tracor 700A Hall Detector
Tracor 703 PID Detector
DB 624 30m Megabore column, J.W. Scientific
Spectra Physics 4400 Chrom Jet Integrator

QUALITY ASSURANCE/QUALITY CONTROL

Quality control and quality assurance were achieved through strict experimental protocol. Chain of custody procedures were observed. All parts of the collection system that come in contact with a sample were cleaned before each use. A systems blank and three calibration runs were performed at the beginning of each day and additional calibrations after every 10 samples.

Standards were prepared from stock mixtures of neat reagent grade compounds prepared by weighing each compound addition to the mixture and weighing an aliquot volume of the final mixture to establish density (weight/volume). For preparation of daily standards, a measured volume of the standard mixture was injected into a nitrogen-filled 1-liter glass gas bottle through a septum side port. A measured volume of the resulting gas mixture was then injected into a 200-ml/min helium stream feeding a glass, carbon-packed concentrating cartridge. After two minutes the cartridge was transferred to the thermal desorber and analyzed exactly as the soil-gas samples.

Prior to each day's sampling, atmospheric field blanks of the entire sampling apparatus were taken and analyzed to check background contamination in the sampling system and cartridges. In addition, serial duplicates were analyzed from 10% of the sample locations as a measure of reproducibility.

Detection limits were 0.01 micrograms or less per liter of soil gas for all compounds analyzed. Analyses are reported to two significant figures; the minimum amount reported is 0.01 micrograms/liter. In some of the analyses, high levels of a compound may have interfered with and prevented detection of a compound present at a very low level and possessing a similar chromatographic retention time.

RESULTS

Table 1 presents the measured soil gas concentrations from each sampling location. Concentrations are reported in micrograms per liter ($\mu\text{g/l}$) of soil gas. Conversion of soil gas concentrations from $\mu\text{g/l}$ (gas) to ppmV can be achieved by the following equation.

$$C_{\text{ppmV}} = C_{\mu\text{g/l}} \times RT/M_w P$$

where C_{ppmV} = soil gas concentration in ppmV
 $C_{\mu\text{g/l}}$ = soil gas concentration in $\mu\text{g/l}$ (gas)
 R = 0.08205 L-Atm/deg-mole
 T = $^{\circ}\text{K}$
 M_w = molecular wgt in grams
 P = pressure in atmospheres

For most compounds C_{ppmV} is approximately $0.25 C_{\mu\text{g/l}}$.

Figures 2 through 5 present the soil gas concentrations of 1,1 DCE, PCE, TCE and 1,1,1 TCA respectively.

TABLE 1
ANALYTICAL RESULTS OF A SOIL GAS
MOTOROLA SWPL
PHOENIX, AZ
(Concentration's reported in µg/L(gas))

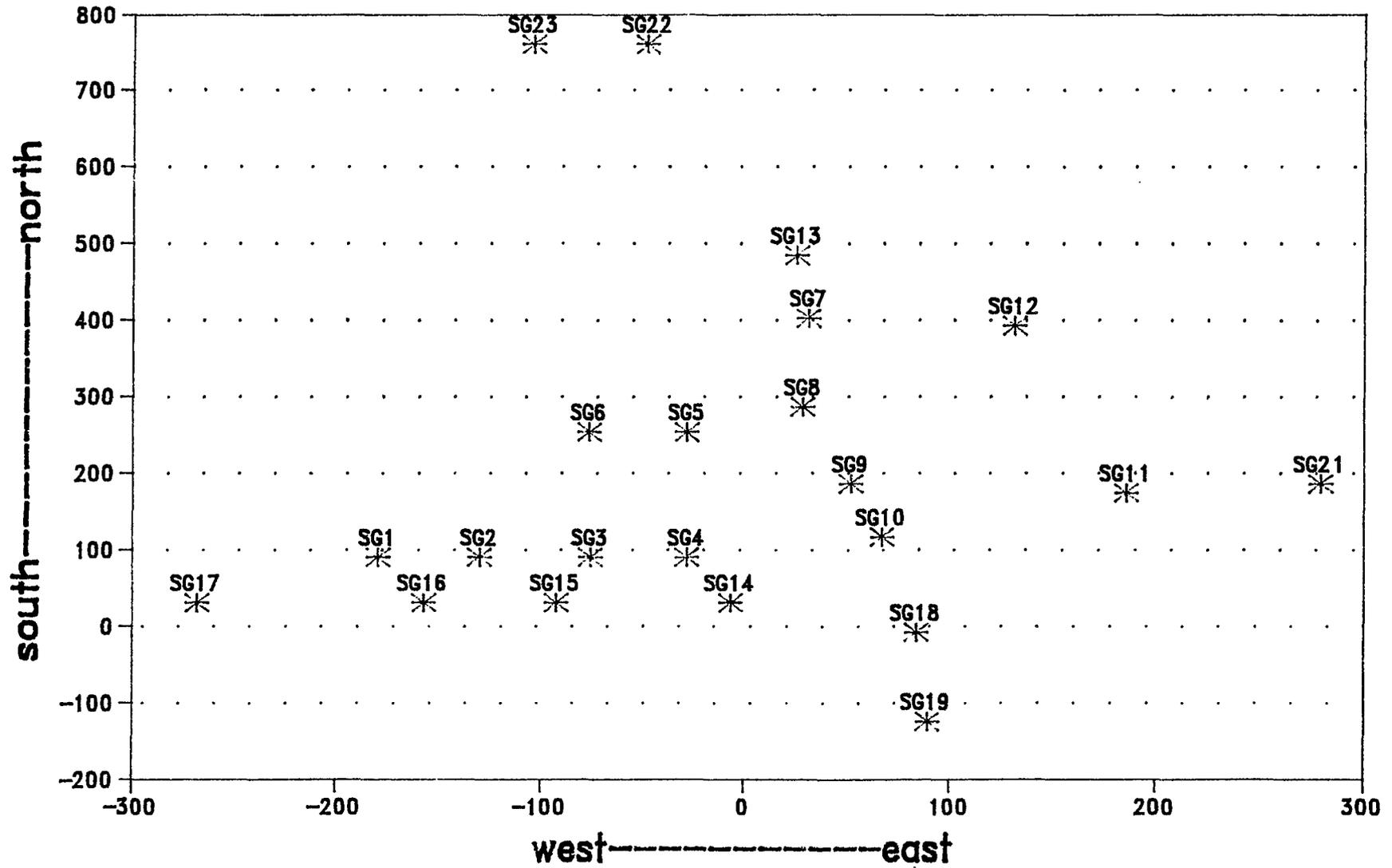
SAMPLE ID	VINYL CHLORIDE	1,1 DCE	FREON-113	1,1,1 TCA	TCE	PCE
SG-138-01-05'	<0.01	0.42	0.20	0.30	0.15	99.36
SG-138-02-05'	<0.01	46.45	13.54	20.08	0.27	175.76
SG-138-03-05'	<0.01	185.30	<0.01	28.00	0.32	62.05
SG-138-04-05'	1.03	132.15	<0.01	27.54	0.03	157.76
SG-138-05-05'	<0.01	1745.94	<0.01	162.83	1.55	618.78
SG-138-06-05'	<0.01	46.83	42.41	18.65	0.31	9.40
SG-138-07-05'	<0.01	0.97	0.24	6.52	<0.01	47.53
SG-138-08-05'	<0.01	>1000.00	NA	>1000.00	2.87	NA
SG-138-09-05'A	<1.00	6519.00	<1.00	3156.00	<1.00	113.00
SG-138-09-05'B	0.51	>1000.00	NA	>1000.00	NA	48.25
SG-138-10-05'A	7.36	993.70	<0.01	48.30	6.03	31.41
SG-138-10-05'B	10.15	1627.31	<0.01	89.86	5.58	44.65
SG-138-11-05'	<0.01	>1000.00	NA	629.33	NA	101.21
SG-138-12-05'	1.23	333.87	<0.01	67.75	0.72	144.52
SG-138-13-05'	<0.01	5.09	3.45	20.73	<0.01	<0.01
SG-138-14-05'	<0.01	0.33	0.60	0.34	<0.01	5.36
SG-138-15-05'	<0.01	223.22	<0.01	23.19	1.63	23.19
SG-138-16-05'	<0.01	315.75	<0.01	61.22	0.95	75.63
SG-138-17-05'	<0.01	11.49	17.91	10.62	<0.01	54.08
SG-138-18-05'A	<0.01	<0.01	0.37	0.15	<0.01	10.72
SG-138-18-05'B	<0.01	<0.01	3.00	0.83	0.16	14.29
SG-138-19-05'A	<0.01	<0.01	<0.01	<0.01	0.09	0.95
SG-138-19-05'B	<0.01	<0.01	<0.01	<0.01	0.09	0.07
SG-138-20-05'	<0.01	<0.01	<0.01	1.72	<0.01	0.30
SG-138-21-05'	<0.01	1.05	1.74	0.54	<0.01	7.02
SG-138-22-05'	<0.01	<0.01	<0.01	<0.01	6.74	<0.01
SG-138-23-05'	<0.01	<0.01	<0.01	<0.01	3.18	0.20
SG-ATM-BLANK26	<0.01	<0.01	<0.01	3.01	<0.01	<0.01
SG-ATM-BLANK27	<0.01	<0.01	<0.01	0.03	<0.01	<0.01
SG-FLDBK032691	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SG-FLDBK032791	<0.01	<0.01	<0.01	0.03	<0.01	<0.01

A, B, DENOTE DUPLICATE SAMPLES

THE CONCENTRATION OF SAMPLES SG-138-08-05' AND SG-138-11-05' COULD NOT BE DETERMINED PRECISELY. THEY OVERLOADED THE COLUMN AND DETECTORS.

NA= NOT REPORTED DUE TO INTERFERENCE FROM ANOTHER CONTAMINANT.

MOTOROLA SWPL

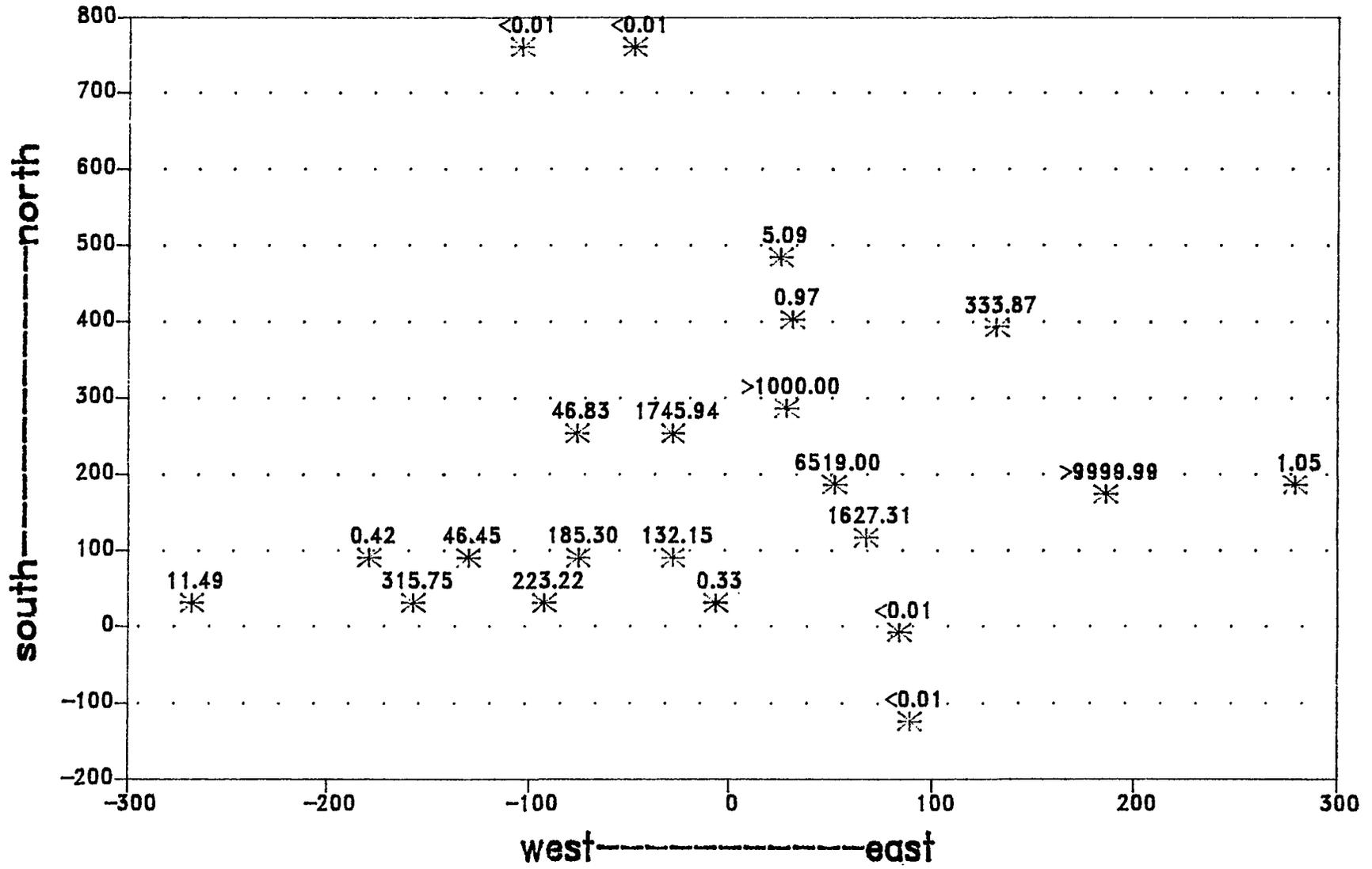


✱ SAMPLING LOCATION

These are approximations based on Dames & Moore preliminary field measurements, and will not correspond exactly with those shown on other figures.

Figure 1

MOTOROLA SWPL

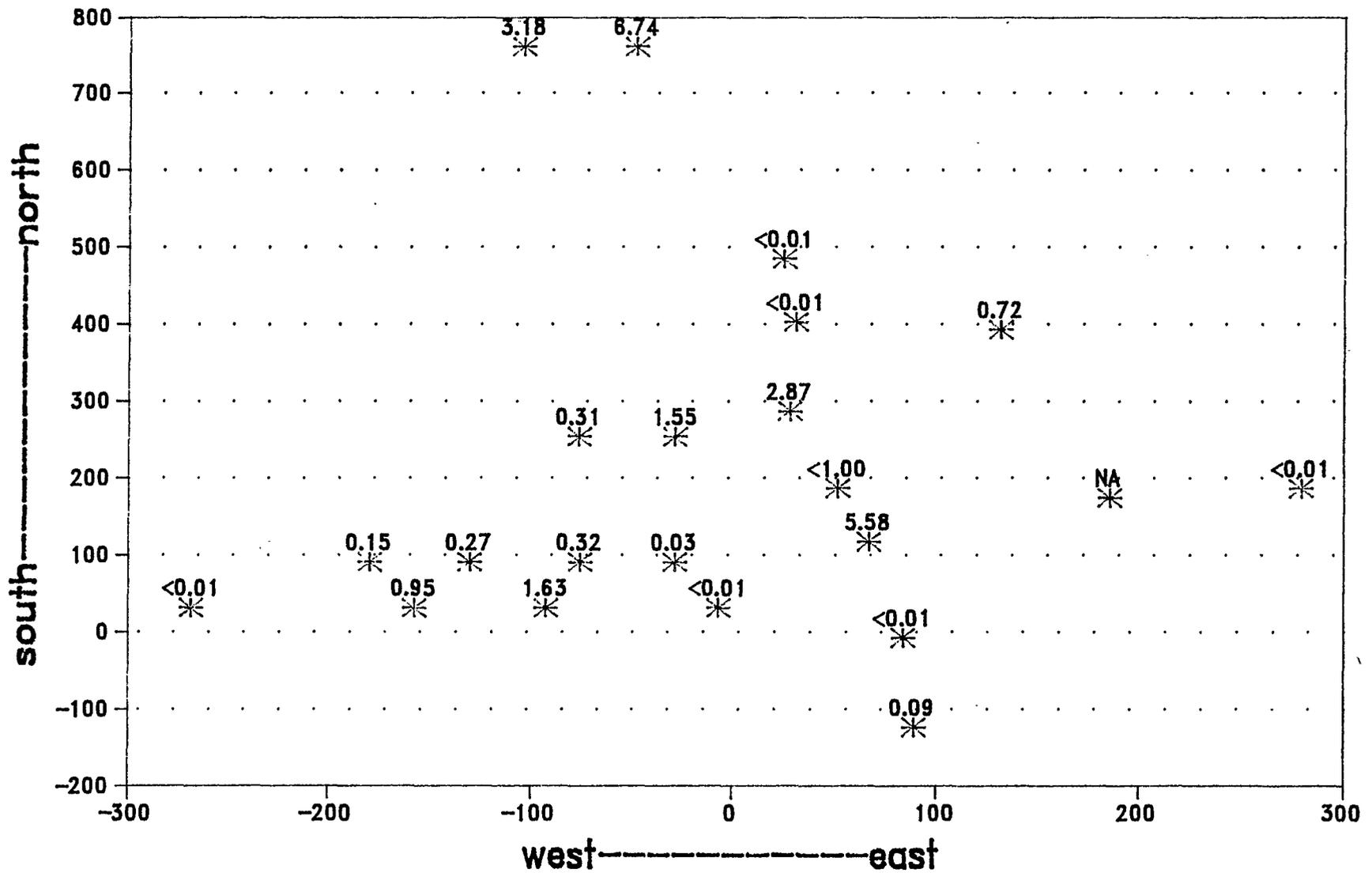


* 1, 1 DCE IN ug/L

These are approximations based on Dames & Moore preliminary field measurements, and will not correspond exactly with those shown on other figures.

Figure 2

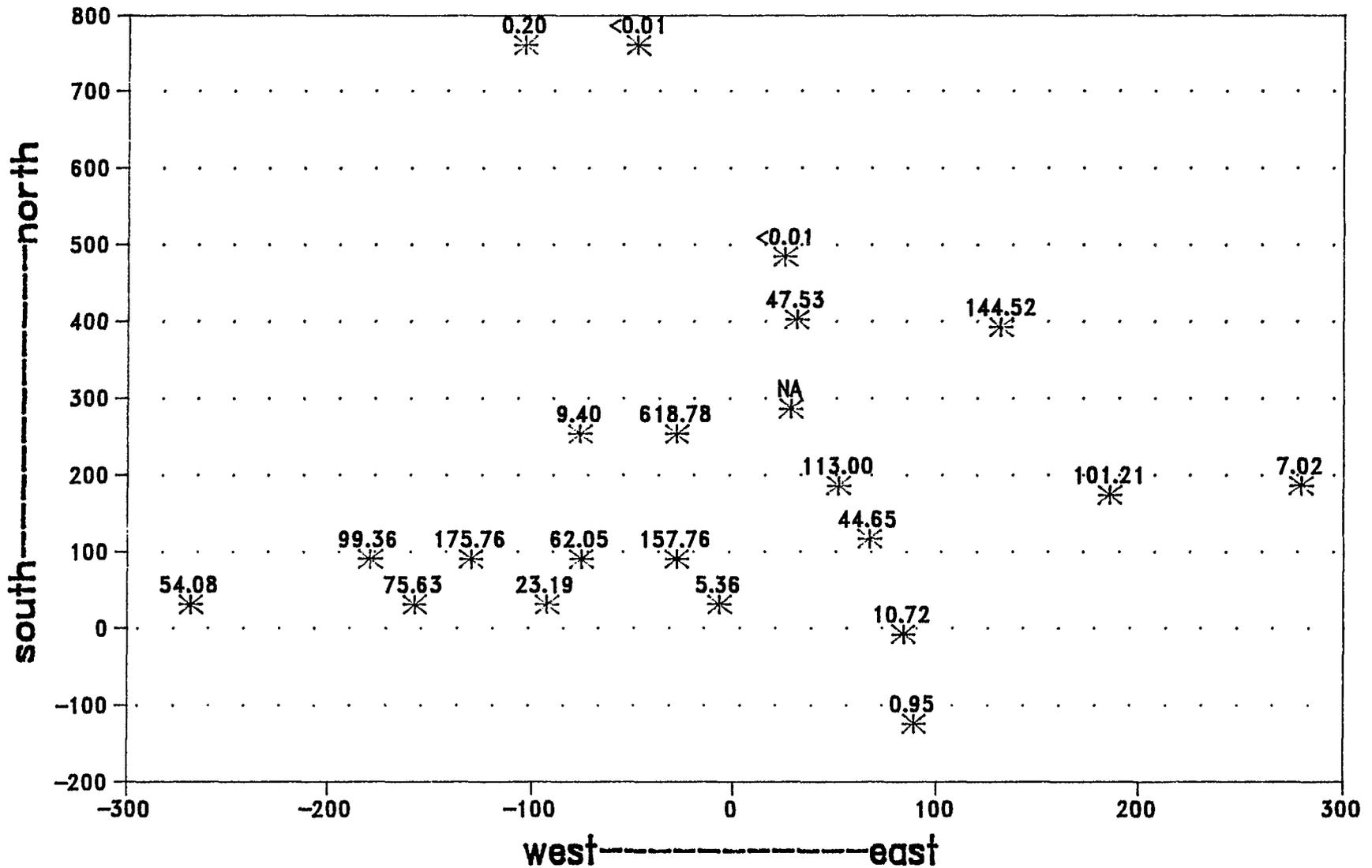
MOTOROLA SWPL



* TCE IN ug/L

These are approximations based on Dames & Moore preliminary field measurements, and will not correspond exactly with those shown on other figures.

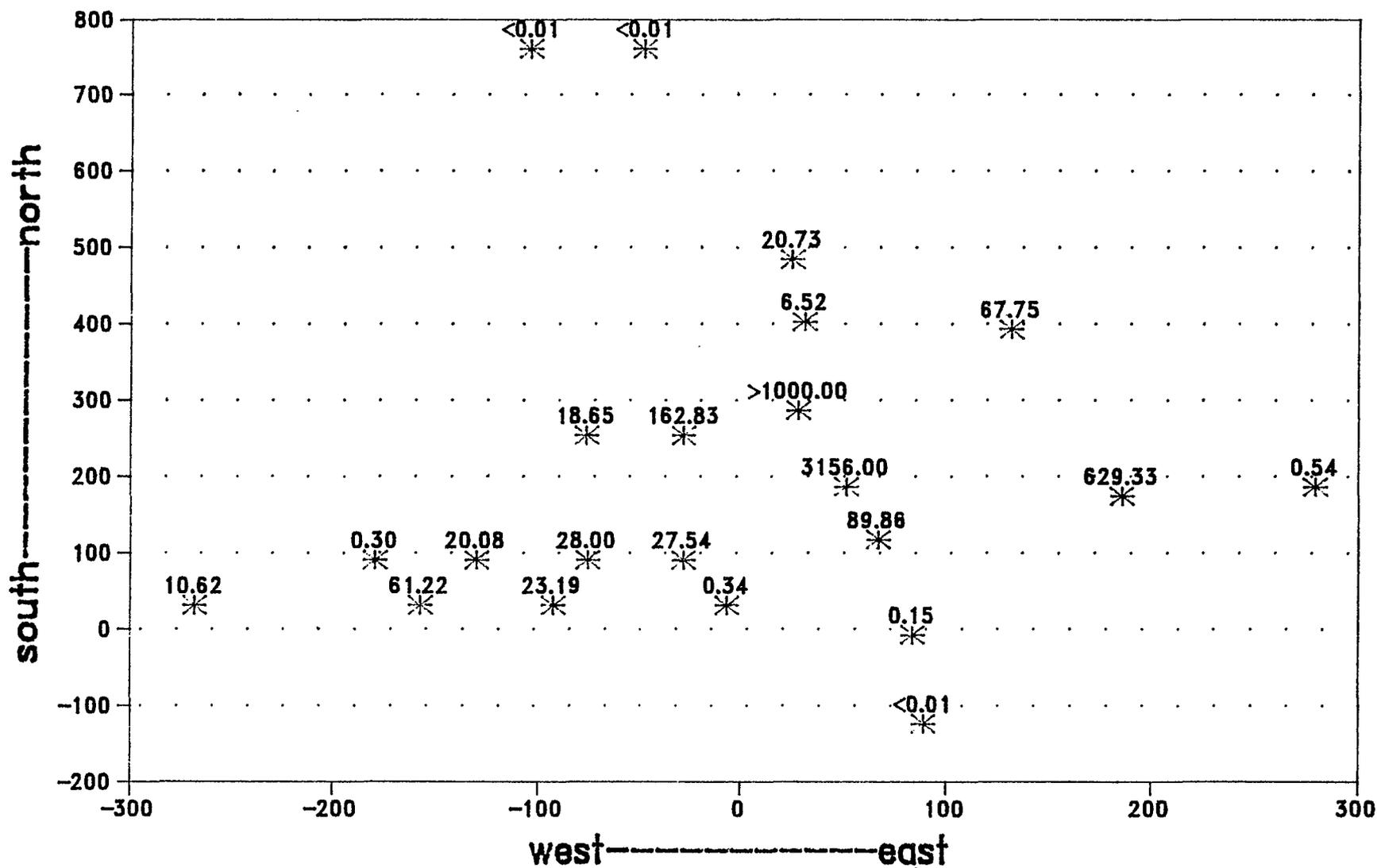
MOTOROLA SWPL



* PCE IN ug/L

These are approximations based on Dames & Moore preliminary field measurements, and will not correspond exactly with those shown on other figures.

MOTOROLA SWPL



※ 1, 1, 1 TCA IN ug/L

These are approximations based on Dames & Moore preliminary field measurements, and will not correspond exactly with those shown on other figures.

Figure 5

**APPENDIX A:
CHROMATOGRAMS AND FIELD DATA SHEETS**

A copy of Appendix A is on file with Dames & Moore, Phoenix, Arizona.

APPENDIX SW-E.5

**TRACER RESEARCH CORP. REPORT FOR SOIL-GAS SAMPLES COLLECTED
10/28/91 THROUGH 11/6/91**



Tracer Research Corporation

3855 North Business Center Drive Tucson, Arizona 85705 (602) 888-9400

9448-158-33

March 3, 1992



Mr. Bruce A. Robinson
Dames & Moore
Pointe Center
7500 North Dreamy Draw Drive
Phoenix, Arizona 85020

Re: Shallow Soil Gas Survey at the Motorola 52nd Street Facility in
Phoenix, Arizona

Dear Mr. Robinson:

The attached report on the shallow soil gas investigation performed by Tracer Research Corporation at the Motorola 52nd Street Facility in Phoenix, Arizona, reflects the changes Dames & Moore requested in our meeting on March 1, 1992. This report supersedes all previous reports.

If you have any questions, please call Mr. Martin D. Favero at (602) 888-9400.

Sincerely,

TRACER RESEARCH CORPORATION

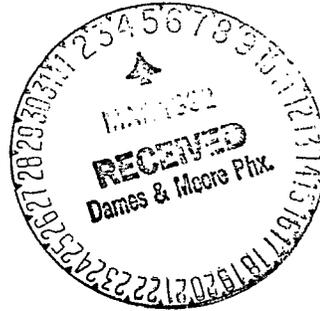
Martin D. Favero
Vice President

Attachment: Shallow Soil Gas Investigation Report (5)



PREPARED FOR:

**Dames & Moore
Pointe Center
7500 North Dreamy Draw Drive
Phoenix, Arizona 85020
(602)371-1110**



**SHALLOW SOIL GAS INVESTIGATION
MOTOROLA 52ND STREET FACILITY
Southwest Parking Lot (SWPL) Area
PHOENIX, ARIZONA**

October 29-November 4, 1991

SUBMITTED BY:

Tracer Research Corporation

**DMMOTOR2.REP
1-91-720-S**



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Appendix A: Analytical Data A-1



1. Survey Narrative

Tracer Research Corporation (Tracer Research) performed a shallow soil gas survey at the Motorola 52nd Street Facility in Phoenix, Arizona. The survey was performed under subcontract to Dames & Moore from October 29 through 31, 1991, and November 4 through November 6, 1991.

1.1 Objectives

The purpose of this investigation was to evaluate the unsaturated (vadose) zone for the presence of halocarbons, which are indicators of subsurface contamination by chlorinated solvents. For this investigation, 28 soil gas samples were collected and analyzed in the field. The samples were analyzed for volatile halocarbons (chlorinated solvents) from the following suite of compounds:

<u>COMPOUND</u>	<u>DETECTOR</u>
vinyl chloride	FID
1,1-dichloroethene (1,1-DCE)	ECD
1,1,2-trichlorotrifluoroethane (F-113)	ECD
1,1,1-trichloroethane (TCA)	ECD
trichloroethene (TCE)	ECD
tetrachloroethene (PCE)	ECD

1.2 Detection Limits

During the site investigation, elevated concentrations of TCA and PCE made it necessary to reduce sample injection sizes and, in some cases, to dilute samples to keep these compounds within the linear and operating ranges of the analytical equipment. However, the injections required to optimize detection limits under these conditions were not always performed by Tracer Research. This condition left many of the sample analyses with elevated detection limits.



2. Soil Gas Survey Theory

2.1 VAPOR TRACE™ Overview

The Vapor Trace™ soil gas survey is a method developed by Tracer Research for investigating subsurface contamination by volatile organic compounds (VOCs). It looks for VOC vapors in the shallow soil gas. Soil gas surveys are based on the premise that when volatile compounds are present in shallow unsaturated soils, their vapors will migrate away from the source via the air filled pore spaces that comprise a significant portion of the unsaturated soil horizon (vadose zone).

Tracer Research's soil gas survey method consists of drawing a small volume of soil gas from the vadose zone, via a hollow steel probe, and analyzing the soil gas sample for the presence of VOCs on laboratory grade equipment in the field. The method provides "real-time" results because samples are analyzed immediately after collection and the results are available within minutes. The presence of VOCs in shallow soil gas indicates the compounds may either be in vadose zone soils or groundwater near the sampling location.

Soil gas technology is most effective in mapping low molecular weight, halogenated solvent chemicals and petroleum hydrocarbons possessing high vapor pressures and low aqueous solubilities. These compounds readily partition out of the groundwater and into the soil gas. Once in the soil gas, VOCs diffuse vertically and horizontally through the soil to the ground surface where they dissipate into the atmosphere. The contamination acts as a source and the above ground atmosphere acts as a sink, with a concentration gradient developing between the two.

2.2 Soil Gas Transport

Transport of VOCs in soil gas occurs primarily via gaseous diffusion. Factors affecting this transport process include tortuosity of the soil matrix (a measure of the added resistance to diffusion imposed by the structure of the medium), the air filled (drained) porosity of the soil, the gaseous diffusion coefficient of the compound of interest, and the temperature of the soil. One of the most important factors to address when evaluating soil gas survey data is the soil porosity as a function of saturation, because saturated soils prevent soil gas transport.

Compounds that are good candidates for soil gas analysis exhibit the following general characteristics: low boiling point, low aqueous solubility, high vapor pressures, and favorable resistance to degradation.



The concentration gradient in soil gas between the source and ground surface may be locally distorted by hydrologic and geologic anomalies (e.g. clays, perched water). Soil gas mapping remains effective as the distribution of the VOCs is usually broader in aerial extent than the localized geologic barriers; and, since many data points are collected during a survey, the contamination is defined using a large number of data points over a relatively large area.

The presence of geologic obstructions on a small scale can create anomalies in the soil gas distribution, but generally does not obscure the broader aerial picture of the distribution of VOCs in the subsurface. For example, trapping VOCs beneath the ground surface impermeable surface covers (e.g., asphalt parking lots or concrete foundations) may increase concentrations of VOCs in shallow soil gas by retarding their transport into the atmosphere. However, the investigator can still identify localized "hot spots" or areas of elevated VOC concentrations by factoring in this effect when evaluating the data for the entire site.

2.2 Benefits

Soil gas volatile compound mapping can reduce the time and costs required to identify and locate VOCs in the subsurface by gathering meaningful data over a large area in a short period of time. A soil gas investigation can assess the general aerial distribution of VOCs quickly, much more quickly than via the repetitive cycle of soil boring/monitoring well installation and subsequent sampling and laboratory analysis. Conventional soil borings and monitoring wells are typically used in concert with soil gas analysis to verify subsurface contamination identified in the soil gas survey. In this manner, soil gas mapping is best used to help place monitoring wells and soil borings effectively by reducing the likelihood of installing monitoring wells in uninformative sampling locations and by minimizing the likelihood of overlooking localized "hot spots." The soil gas survey is not intended to be a substitute for conventional methodology, but rather to enhance it by rapidly providing data that enables the site assessor to design a superior site investigation.

2.3 Survey Methodology

Sampling Equipment

Tracer Research's mobile vans, which have been specifically designed to perform soil gas surveys, are used for both soil gas sampling and analysis. The van interior contains a fully equipped soil gas laboratory featuring a laboratory-grade gas chromatograph (GC) and chromatographic data system. Sampling is accomplished using a probe emplacement mechanism installed in the back of each van. In addition, the van is made self sufficient by



two internal gasoline powered generators that provide the electrical power (110 volts AC) to operate the analytical instrumentation and field equipment.

Probe Installation

The hydraulic probe emplacement mechanism, designed and manufactured by Tracer Research, consists of a hydraulic hammer and press for driving and withdrawing sampling probes. The system employs a hydraulic impact hammer to drive probes past cobbles and through unusually hard soil. Probes can quickly be installed to depths in excess of 20 feet below ground surface, and can quickly be removed once sampling is completed.

Tracer Research uses steel probes fitted with aluminum detachable drive points for soil gas sampling. To eliminate the possibility for cross contamination or carryover, sufficient quantities of probes are stored in the sampling van to ensure that probes are used only once daily.

Soil Gas Sampling

Once inserted into the vadose zone, the aboveground end of the sampling probes are fitted with a sampling manifold that connects the probe to the vacuum pump line. At each sampling location, two to five liters of soil gas are evacuated to adequately purge the ambient air from the probe before sampling. The relative vacuum at each sampling location is recorded and correlated with pump flow rate to document the volume of soil gas removed and the relative gas permeability of the soils being sampled.

The sampling probe manifold allows soil gas samples to be collected directly from within the sampling probe. The sample manifold consists of a sampling adaptor and a silicon tubing septum that permits sampling by syringe. Samples are collected in a glass syringe affixed with a stainless steel syringe needle via direct puncture through the silicon septum and directly into the steel probe. The sample does not contact the sampling equipment upstream of the probe, thus eliminating the potential for cross contamination from the sampling manifold, pump, and vacuum line.

Sample Containers

By using the analytical syringe as the sample container (the syringe can be used to directly inject the sample into the instrument or can be sub-sampled for smaller injection volumes) the need for an intermediary sample container is eliminated. The extremely low concentrations of VOCs encountered in soil gas samples prohibit sample exposure to plastic including mylar (Tedlar Bags), rubber, Teflon, Viton, etc., as these materials can easily sorb all or a major portion of the VOCs in the sample. These materials cannot be part of the



sampling stream, as they can contribute significantly to cross contamination between samples. Samples are analyzed shortly after collection, as exposure in excess of one hour to glass or untreated metal surfaces can cause sample quality degradation via VOC sorption.

Analytical Instrumentation

The analyses are performed on laboratory-grade GCs set up specifically for soil gas analysis. The laboratory grade GC (either a Varian 3300 or Hewlett-Packard 5890) is temperature programmable and capable of maintaining calibration at sub-part per billion levels. The chromatographs are equipped with dual columns connected to a flame ionization detector (FID) for the detection of petroleum hydrocarbons and an electron-capture detector (ECD) for the detection of halogenated compounds. Photoionization and thermal conductivity detectors are also employed, when the compounds of interest are not amenable to detection by either a FID or an ECD. The GCs are connected to a chromatographic data system that compiles and analyzes the results from each analysis.

2.4 Quality Assurance

Tracer Research Corporation's quality assurance program is followed to maintain data reproducibility throughout the investigation. An overview presenting the predominant aspects of the quality assurance program is presented below.

Analytical Quality Assurance Samples

Quality assurance samples are performed at the listed, or greater, frequencies, depending on the number of soil gas samples analyzed:

<u>Sample Type</u>	<u>Frequency</u>
Ambient Air Blanks (AIR)	3 per day (or every 10 samples)
Analytical System Blanks (N2 BLK)	1 per day (or as needed)
Continuing Calibration Check (STD)	20% (1 every 5 samples)
System Blank (SYSTEM)	1 per day (each set of cleaned probes)
Reagent Blank (H2O BLK)	1 per set of working standards
Sample Duplicates	10% to 100% of all soil gas samples



The ambient air blanks are obtained on site by sampling the air immediately outside the soil gas van and directly injecting it into the GC.

Analytical system blanks are taken to demonstrate that the analytical instrumentation is not contaminated. These are performed by injecting carrier gas into the GC with the sampling syringe. Subsampling syringes are checked in similar fashion by nitrogen injection. All sampling and subsampling syringes are decontaminated after use and are not reused before being decontaminated by anionic detergent washing and baking at 100°C.

System blanks are analyzed to check for contamination of the sampling apparatus (probe, sampling manifold, sampling pump and vacuum line). A soil gas sample is collected using standard soil gas sampling techniques, but without putting the probe into the ground. The results are compared to those obtained from a concurrently sampled ambient air analysis.

If the blanks detect compounds of interest at concentrations that indicate equipment contamination or that exceed normal background levels (ambient air analysis), corrective actions are performed to return the system within operating limits. If the problem cannot be corrected, an out-of-control event is documented and reported.

A reagent blank is performed to ensure that the solvent used to dilute the stock standards is not contaminated. Analytical instruments are calibrated daily using fresh working standards made from NBS traceable standards and reagent blanked solvents.

Quantitative precision is assured by duplicate analysis of at least 10 percent of all soil gas samples. If short analytical times are involved, typically less than 5 minutes, all samples are analyzed in duplicate.

Soil Gas Sampling Quality Assurance

The following procedures are performed to ensure soil gas samples are similarly collected.

Sampling Manifolds

Sampling Manifolds (Tracer Research's custom design) connect the sample probe to the vacuum line and pump. The manifold is designed to eliminate sample exposure to the sampling equipment with the exception of the probe and the sampling syringe. At the end of each day, sampling manifolds are cleaned with hot soap and water, and baked.



Sampling Probes

Steel probes are used only once each day and then washed with high pressure soap and hot water spray or steam-cleaned to eliminate the possibility of cross contamination. Enough sampling probes are carried on each van to avoid the need to reuse any during the day.

Sampling Efficiency

Soil gas pumping is monitored by a vacuum gauge to insure that an adequate gas flow is obtained from the vadose zone. A negative pressure (vacuum) of two inches Hg less than the maximum capacity of the pump (evacuation rate <0.2 cfm) indicates that a reliable gas sample cannot be obtained because the soil has very low air permeability. These data are recorded and presented in the field log.

2.5 Compound Identification & Quantitation

Compounds detected in the samples are identified by chromatographic retention time on the analytical columns. The compounds are quantified by comparing the detector response of the sample to the response factor measured for calibration standards (external standardization). Instrument calibration checks are analyzed throughout the day to monitor the response factor and retention time.

2.6 Detection Limits

Detection limits are dependent upon the volume of the injection as well as the sensitivity of the detector to individual compounds. Generally, the larger the injection size, the greater the sensitivity. However, peaks for target compounds must be maintained within the linear and operating ranges of the analytical equipment. When target compounds are present at high concentrations, it is frequently necessary to dilute the sample or to decrease the injection volume. This may cause increased detection limits for other compounds in the analysis. Conversely, to obtain a value of "non-detect," it is beneficial to inject the maximum permissible sample size into the instrument. Thus, several injections are frequently required for each soil gas sample collected. Tracer Research sample injection volumes range between 1 ul and 2000 ul.

The detection limits of the various compounds range from 0.01 ug/L for vinyl chloride to 0.0001 ug/L for compounds such as TCA and TCE. The lowest detection limits achievable with the analytical instrument for each compound is listed in the condensed data table (Appendix A) and is labeled "Air." These detection limits vary between analyses depending



on the conditions of the measurement, in particular, the sample size. If any component being analyzed is not detected, the detection limit for that compound in that analysis is given as a "less than" value (e.g. <0.02 ug/l). Detection limits for GC analyses are calculated from the current response factor, the sample size, and the calculated minimum peak size (area) that could have been observed under the conditions of the analysis.



Appendix A: Analytical Data

DAMES & MOORE/MOTOROLA 52ND STREET FACILITY/PHOENIX, ARIZONA JOB #1-91-720-S

10/28/91

SOUTHWEST PARKING LOT (SWPL) AREA

SAMPLE	VINYL CHLORIDE ug/l	1,1-DCE ug/l	F-113 ug/l	TCA ug/l	TCE ug/l	PCE ug/l
AIR	<0.1	<0.05	<0.001	0.0003	<0.002	0.001
158-1-5'	<0.6	<0.2	<0.006	0.002	<0.008	<0.004
158-3-5'	<0.3	<0.1	<0.003	0.001	<0.004	<0.002
158-2-5'	<0.2	<0.1	0.002	0.0007	<0.003	0.002
158-4-5'	<0.2	<0.1	0.004	0.0008	<0.003	0.002
158-5-5'	<0.2	<0.1	<0.002	0.002	<0.003	0.002
AIR	<0.1	<0.05	<0.001	0.0004	<0.002	<0.0008
158-6-5'	<0.2	<0.1	0.005	0.0004	<0.003	<0.002
158-7-5'	<0.2	<0.1	0.002	0.0005	<0.003	<0.002
158-8-5'	<0.2	<0.1	0.002	0.002	<0.003	<0.002
158-9-4'	<0.2	<0.1	0.002	0.002	<0.003	0.002
AIR	<0.1	<0.05	<0.001	0.002	<0.002	<0.0008

Analyzed by: T. Waltz

Proofed by: M. F.

Date Submitted: 3/3/92



DAMES & MOORE/MOTOROLA 52ND STREET FACILITY/PHOENIX, ARIZONA/JOB #1-91-720-S

10/29/91

SOUTHWEST PARKING LOT (SWPL) AREA

SAMPLE	VINYL CHLORIDE ug/l	1,1-DCE ug/l	F-113 ug/l	TCA ug/l	TCE ug/l	PCE ug/l
AIR	<0.1	<0.05	0.0006	0.001	<0.002	0.0008
158-10-4'	<0.3	12	0.5	0.4	<0.2	2
158-11-4'	<0.3	440	1	53	<2	12
158-12-4'	<0.3	98	<2	7	<3	9
158-13-4'	<0.3	<49	<1	2	<2	4
158-14-3'	<0.3	<0.2	<0.006	0.001	<0.008	<0.004
AIR	<0.1	<0.05	0.001	0.002	<0.002	0.002
158-15-3.5'	<0.2	<0.1	<0.002	0.003	<0.003	<0.002
158-16-3'	<0.2	<0.1	<0.002	0.003	<0.003	<0.002
158-17-3'	<0.1	<0.05	<0.001	0.002	<0.002	<0.0008
AIR	<0.2	<0.1	0.01	0.02	<0.003	<0.002
158-18-5'	<0.6	150	<1	190	<2	2
158-19-4'	<0.6	3900	4	110000	<16000	53
158-20-5'	<0.2	<490000	<13000	65000	<16000	<7600
158-21-5'	<0.2	<490000	<13000	16000	<16000	7600
AIR	<0.1	<0.05	0.03	0.08	<0.002	0.002

Analyzed by: T. Waltz

Proofed by: M.F.

Date Submitted: 3/3/92



DAMES & MOORE/MOTOROLA 52ND STREET FACILITY/PHOENIX, ARIZONA/JOB #1-91-720-S

10/30/91

SOUTHWEST PARKING LOT (SWPL) AREA

SAMPLE	VINYL CHLORIDE ug/l	1,1-DCE ug/l	F-113 ug/l	TCA ug/l	TCE ug/l	PCE ug/l
AIR	<0.2	<0.08	0.001	0.01	<0.002	0.0009
158-22-5'	<0.2	<39	0.5	2	<1	28
158-23-5'	<0.2	1400	4	17000	<2	65
158-24-4'	<0.2	3900	<110	1800	<120	350
158-25-5'	<0.2	3900	<110	<50	<120	170
158-26-5'	<0.2	<79	<2	<1	<2	16
AIR	<0.1	<0.04	<0.001	0.001	<0.001	<0.0004
158-27-4'	<0.2	860	19	50	9	790
158-28-5'	<0.2	<3900	<110	670	<120	190
158-29-5'	<0.2	<3900	<110	1400	<120	200
158-30-5'	<0.2	100	<1	61	<1	<1
158-31-5'	<0.2	<0.4	0.04	0.2	0.1	0.4
158-32-3'	<0.2	<4	<0.1	<0.05	<0.1	<0.04
AIR	<0.1	<0.8	<0.002	0.002	<0.002	0.0008

Analyzed by: T. Waltz

Proofed by: M.F.

Date Submitted: 3/2/92



DAMES & MOORE/MOTOROLA 52ND STREET FACILITY/PHOENIX, ARIZONA/JOB #1-91-720-S

10/31/91

SOUTHWEST PARKING LOT (SWPL) AREA

SAMPLE	VINYL CHLORIDE ug/l	1,1-DCE ug/l	F-113 ug/l	TCA ug/l	TCE ug/l	PCE ug/l
AIR	<0.1	<0.03	0.002	0.01	<0.001	0.003
158-33-5'	<0.1	<0.6	<0.02	0.4	<0.02	0.1
158-34-5'	<0.1	<0.3	0.02	0.04	<0.01	0.8
158-35-4.5'	<0.1	<16	0.2	0.3	<0.6	0.5
158-36-5'	<0.1	<0.3	0.02	0.2	2	0.03
AIR	<0.1	<0.03	0.03	0.03	<0.001	0.02
AIR	<0.1	<0.03	0.004	0.006	<0.001	0.002

11/04/91

SAMPLE	VINYL CHLORIDE ug/l	1,1-DCE ug/l	F-113 ug/l	TCA ug/l	TCE ug/l	PCE ug/l
AIR	<0.05	<0.06	<0.002	0.0009	<0.002	0.0007
158-46-5'	<0.05	6	0.09	0.8	0.2	1
158-47-6'	<0.05	<6	0.4	0.09	0.5	0.7
158-48-6'	<0.05	28	0.2	4	0.6	1
158-49-3'	<0.05	<3	<0.09	<0.04	<0.1	<0.04
158-50-5'	<0.05	<3	<0.09	<0.04	<0.1	<0.04
AIR	<0.05	<0.03	<0.0009	0.01	<0.001	<0.0004
158-51-4'	<0.05	<3	<0.09	<0.04	<0.1	<0.04
158-52-5'	<0.05	<3100	<89	400	<120	<36
158-53-5'	<0.05	48	<0.9	6	<1	0.4
158-54-5'	<0.05	<31	1	<0.4	<1	3
AIR	<0.05	<0.03	0.04	0.003	<0.001	0.005

Analyzed by: T. Waltz

Proofed by: M.F.

Date Submitted: 3/3/92



DAMES & MOORE/MOTOROLA 52ND STREET FACILITY/PHOENIX, ARIZONA/JOB #1-91-720-S

11/05/91

SOUTHWEST PARKING LOT (SWPL) AREA

SAMPLE	VINYL CHLORIDE ug/l	1,1-DCE ug/l	F-113 ug/l	TCA ug/l	TCE ug/l	PCE ug/l
AIR	<0.03	<0.04	0.02	0.004	<0.001	0.008
AIR	<0.03	<0.07	<0.002	0.0005	<0.003	0.002
158-67-4.5'	<0.03	<19	<0.5	<0.1	<0.7	<0.2
158-68-5'	<0.03	<0.4	<0.01	0.008	<0.01	<0.004
158-69-3.5'	<0.03	<0.2	0.01	0.008	0.03	0.05
AIR	<0.03	<0.04	0.0005	0.002	<0.001	0.008

11/06/91

SAMPLE	VINYL CHLORIDE ug/l	1,1-DCE ug/l	F-113 ug/l	TCA ug/l	TCE ug/l	PCE ug/l
AIR	<0.06	<0.03	0.001	0.003	<0.001	0.002
158-29A-6'	<0.06	<3400	<100	700	<110	74
AIR	<0.06	0.02	<0.001	0.02	<0.001	0.002
158-74-5'	<0.06	<3400	<100	820	<110	74
158-19A-5.5'	<0.06	<3400	<100	1600	<110	<37
158-75-5'	<0.06	<3400	<100	580	<110	56
AIR	<0.06	<0.03	<0.001	0.005	<0.001	0.0007

Analyzed by: T. Waltz

Proofed by: _____

M.F.

Date Submitted: 3/3/92



APPENDIX SW-F

1991 PUMPING DATA FOR DM 201 AND DM 2010B1

APPENDIX SW-F

1991 PUMPING DATA FOR DM 201 AND DM 2010B1

TABLE SW-F.1
1991 PUMPING DATA FOR DM 201 AND DM 201-OB1

MI52 FR RI REPORT
FEBRUARY 1992

DATE	DM 201 LONG-TERM PUMPING DATA				DM 201-OB1 LONG-TERM PUMPING DATA				TOTAL VOLUME PUMPED FROM DM201 & DM201-OB1
	ESTIMATED PUMPING		ESTIMATED	ESTIMATED	ESTIMATED PUMPING		ESTIMATED	ESTIMATED	
	RATE	MINUTES	VOLUME	CUMULATIVE	RATE	MINUTES	VOLUME	CUMULATIVE	
	(GPM)	PUMPED	PUMPED	VOLUME PUMPED	(GPM)	PUMPED	PUMPED	VOLUME PUMPED	
03/11/91	3.0	180	540	540					540
03/12/91	3.0	470	1,410	1,950					1,950
03/13/91	3.0	570	1,710	3,660					3,660
03/14/91	3.0	382	1,146	4,806					4,806
03/15/91	3.0	485	1,455	6,261					6,261
03/18/91	3.0	563	1,689	7,950					7,950
03/19/91	3.0	540	1,620	9,570					9,570
03/20/91	3.0	575	1,725	11,295					11,295
03/21/91	3.0	570	1,710	13,005					13,005
03/22/91	3.0	495	1,485	14,490					14,490
03/25/91	3.0	485	1,455	15,945					15,945
03/28/91	3.0	520	1,560	17,505					17,505
03/29/91	3.0	480	1,440	18,945					18,945
04/01/91	3.0	374	1,122	20,067					20,067
04/02/91	3.0	480	1,440	21,507					21,507
04/03/91	3.0	420	1,260	22,767					22,767
04/04/91	3.0	585	1,755	24,522					24,522
04/05/91	3.0	435	1,305	25,827					25,827
04/08/91	3.0	480	1,440	27,267					27,267
04/10/91	3.0	330	990	28,257					28,257
04/11/91	3.0	350	1,050	29,307					29,307
04/12/91	3.0	510	1,530	30,837					30,837
04/15/91	3.0	210	630	31,467					31,467
04/29/91	3.0	370	1,110	32,577					32,577
04/30/91	3.0	510	1,530	34,107					34,107
05/01/91	3.0	510	1,530	35,637					35,637
05/02/91	3.0	480	1,440	37,077					37,077
05/03/91	3.0	450	1,350	38,427					38,427
05/06/91	3.0	240	720	39,147					39,147
05/07/91	3.0	480	1,440	40,587					40,587
05/08/91	3.0	480	1,440	42,027					42,027
05/09/91	3.0	480	1,440	43,467					43,467
05/10/91	3.0	300	900	44,367					44,367
05/13/91	3.0	540	1,620	45,987					45,987
05/14/91	3.0	540	1,620	47,607					47,607
05/15/91	3.0	450	1,350	48,957					48,957
05/16/91	3.0	450	1,350	50,307					50,307

TABLE SW-F.1
1991 PUMPING DATA FOR DM 201 AND DM 201-OB1

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DATE	DM 201 LONG-TERM PUMPING DATA				DM 201-OB1 LONG-TERM PUMPING DATA				TOTAL VOLUME PUMPED FROM DM201 & DM201-OB1
	ESTIMATED PUMPING		ESTIMATED	ESTIMATED	ESTIMATED PUMPING		ESTIMATED	ESTIMATED	
	RATE	MINUTES	VOLUME	CUMULATIVE	RATE	MINUTES	VOLUME	CUMULATIVE	
	(GPM)	PUMPED	PUMPED	VOLUME PUMPED	(GPM)	PUMPED	PUMPED	VOLUME PUMPED	
05/20/91	3.0	450	1,350	51,657					51,657
05/21/91	3.0	390	1,170	52,827					52,827
05/22/91	3.0	330	990	53,817					53,817
05/23/91	3.0	450	1,350	55,167					55,167
05/24/91	3.0	450	1,350	56,517					56,517
05/28/91	3.0	390	1,170	57,687					57,687
05/29/91	3.0	390	1,170	58,857					58,857
05/30/91	3.0	420	1,260	60,117					60,117
05/31/91	3.0	390	1,170	61,287					61,287
06/03/91	3.0	390	1,170	62,457					62,457
06/04/91	3.0	390	1,170	63,627					63,627
06/05/91	3.0	390	1,170	64,797					64,797
06/06/91	3.0	390	1,170	65,967					65,967
06/07/91	3.0	390	1,170	67,137					67,137
06/10/91	3.0	390	1,170	68,307					68,307
06/11/91	3.0	570	1,710	70,017					70,017
06/12/91	3.0	450	1,350	71,367					71,367
06/24/91	3.0	180	540	71,907					71,907
06/25/91	3.0	420	1,260	73,167					73,167
06/26/91	3.0	300	900	74,067					74,067
06/28/91	3.0	310	930	74,997	2.0	184	368	368	75,365
07/08/91	5.0	280	1,400	76,397	1.0	280	280	648	77,045
07/09/91	5.0	375	1,875	78,272	1.0	375	375	1,023	79,295
07/10/91	10.0	210	2,100	80,372	1.0	210	210	1,233	81,605
07/11/91	3.0	330	990	81,362	1.0	320	320	1,553	82,915
07/12/91	3.0	495	1,485	82,847	1.0	495	495	2,048	84,895
07/15/91	3.0	270	810	83,657	1.0	270	270	2,318	85,975
07/16/91	3.0	350	1,050	84,707	1.0	350	350	2,668	87,375
07/17/91	3.0	385	1,155	85,862	1.0	385	385	3,053	88,915
07/18/91	3.0	450	1,350	87,212	1.0	450	450	3,503	90,715
07/19/91	3.0	450	1,350	88,562	1.0	450	450	3,953	92,515
07/24/91	3.0	490	1,470	90,032	2.2	490	1,090	5,043	95,075
07/25/91	3.0	480	1,440	91,472	3.0	480	1,440	6,483	97,955
07/26/91	3.0	500	1,500	92,972	3.0	500	1,500	7,983	100,955
07/29/91	3.0	480	1,440	94,412	3.0	480	1,440	9,423	103,835
07/30/91	3.0	490	1,470	95,882	3.0	490	1,470	10,893	106,775
07/31/91	3.0	480	1,440	97,322	3.0	480	1,440	12,333	109,655

TABLE SW-F.1
1991 PUMPING DATA FOR DM 201 AND DM 201-OB1

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DATE	DM 201 LONG-TERM PUMPING DATA				DM 201-OB1 LONG-TERM PUMPING DATA				TOTAL VOLUME PUMPED FROM DM201 & DM201-OB1
	ESTIMATED PUMPING		ESTIMATED	ESTIMATED	ESTIMATED PUMPING		ESTIMATED	ESTIMATED	
	RATE	MINUTES	VOLUME	CUMULATIVE	RATE	MINUTES	VOLUME	CUMULATIVE	
	(GPM)	PUMPED	PUMPED	VOLUME PUMPED	(GPM)	PUMPED	PUMPED	VOLUME PUMPED	
08/01/91	3.0	480	1,440	98,762	3.0	480	1,440	13,773	112,535
08/02/91	3.0	450	1,350	100,112	3.0	450	1,350	15,123	115,235
08/05/91	3.0	490	1,470	101,582	3.0	490	1,470	16,593	118,175
08/06/91	3.0	495	1,485	103,067	3.0	495	1,485	18,078	121,145
08/07/91	3.0	480	1,440	104,507	3.0	480	1,440	19,518	124,025
08/08/91	3.0	490	1,470	105,977	3.0	490	1,470	20,988	126,965
08/09/91	3.0	510	1,530	107,507	3.0	510	1,530	22,518	130,025
08/12/91	3.0	480	1,440	108,947	3.0	480	1,440	23,958	132,905
08/13/91	3.0	480	1,440	110,387	3.0	480	1,440	25,398	135,785
08/14/91	3.0	480	1,440	111,827	3.0	480	1,440	26,838	138,665
08/15/91	3.0	486	1,458	113,285	3.0	486	1,458	28,296	141,581
08/16/91	3.0	480	1,440	114,725	3.0	480	1,440	29,736	144,461
08/19/91	3.0	480	1,440	116,165	3.0	480	1,440	31,176	147,341
08/20/91	3.0	480	1,440	117,605	3.0	480	1,440	32,616	150,221
08/21/91	3.0	480	1,440	119,045	3.0	480	1,440	34,056	153,101
08/22/91	3.0	480	1,440	120,485	3.0	480	1,440	35,496	155,981
08/23/91	3.0	520	1,560	122,045	3.0	520	1,560	37,056	159,101
08/26/91	3.0	300	900	122,945	3.0	300	900	37,956	160,901
08/27/91	3.0	365	1,095	124,040	3.0	365	1,095	39,051	163,091
08/28/91	3.0	330	990	125,030	3.0	330	990	40,041	165,071
08/29/91	3.0	367	1,101	126,131	3.0	367	1,101	41,142	167,273
08/30/91	3.0	293	879	127,010	3.0	293	879	42,021	169,031
09/03/91	3.0	485	1,455	128,465	3.0	485	1,455	43,476	171,941
09/04/91	3.0	540	1,620	130,085	3.0	540	1,620	45,096	175,181
09/05/91	3.0	300	900	130,985	3.0	300	900	45,996	176,981
09/06/91	3.0	510	1,530	132,515	3.0	510	1,530	47,526	180,041
09/09/91	3.0	480	1,440	133,955	3.0	480	1,440	48,966	182,921
09/10/91	3.0	500	1,500	135,455	3.0	500	1,500	50,466	185,921
09/11/91	3.0	460	1,380	136,835	3.0	460	1,380	51,846	188,681
09/12/91	3.0	430	1,290	138,125	3.0	430	1,290	53,136	191,261
09/13/91	3.0	505	1,515	139,640	3.0	505	1,515	54,651	194,291
09/16/91	3.0	520	1,560	141,200	3.0	520	1,560	56,211	197,411
09/17/91	3.0	440	1,320	142,520	3.0	440	1,320	57,531	200,051
09/18/91	3.0	580	1,740	144,260	3.0	580	1,740	59,271	203,531
09/20/91	3.0	180	540	144,800	3.0	180	540	59,811	204,611
09/23/91	3.0	490	1,470	146,270	3.0	490	1,470	61,281	207,551
09/24/91	3.0	520	1,560	147,830	3.0	520	1,560	62,841	210,671

TABLE SW-F.1
1991 PUMPING DATA FOR DM 201 AND DM 201-OB1

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DATE	DM 201 LONG-TERM PUMPING DATA				DM 201-OB1 LONG-TERM PUMPING DATA				TOTAL VOLUME PUMPED FROM DM201 & DM201-OB1
	ESTIMATED PUMPING		ESTIMATED	ESTIMATED CUMULATIVE	ESTIMATED PUMPING		ESTIMATED	ESTIMATED CUMULATIVE	
	RATE (GPM)	MINUTES PUMPED	VOLUME PUMPED	VOLUME PUMPED	RATE (GPM)	MINUTES PUMPED	VOLUME PUMPED	VOLUME PUMPED	
09/25/91	3.0	450	1,350	149,180	3.0	450	1,350	64,191	213,371
09/26/91	3.0	490	1,470	150,650	3.0	490	1,470	65,661	216,311
09/27/91	3.0	480	1,440	152,090	3.0	480	1,440	67,101	219,191
09/30/91	3.0	540	1,620	153,710	3.0	540	1,620	68,721	222,431
10/01/91	3.0	525	1,575	155,285	3.0	525	1,575	70,296	225,581
10/03/91	3.0	490	1,470	156,755	3.0	490	1,470	71,766	228,521
10/04/91	3.0	510	1,530	158,285	3.0	510	1,530	73,296	231,581
10/14/91	3.0	370	1,110	159,395	3.0	370	1,110	74,406	233,801
10/15/91	3.0	510	1,530	160,925	3.0	510	1,530	75,936	236,861
10/16/91	3.0	480	1,440	162,365	3.0	480	1,440	77,376	239,741
10/17/91	3.0	480	1,440	163,805	3.0	480	1,440	78,816	242,621
10/18/91	3.0	505	1,515	165,320	3.0	505	1,515	80,331	245,651
10/21/91	3.0	375	1,125	166,445	3.0	375	1,125	81,456	247,901
10/22/91	3.0	325	975	167,420	3.0	325	975	82,431	249,851
10/23/91	3.0	435	1,305	168,725	3.0	300	900	83,331	252,056
10/25/91	3.0	190	570	169,295	3.0	190	570	83,901	253,196
10/28/91	3.0	395	1,185	170,480	3.0	395	1,185	85,086	255,566
10/30/91	3.0	400	1,200	171,680	3.0	400	1,200	86,286	257,966
10/31/91				171,680	3.0	350	1,050	87,336	259,016
11/01/91	3.0	120	360	172,040	3.0	380	1,140	88,476	260,516
11/12/91	3.0	285	855	172,895	3.0	285	855	89,331	262,226
11/13/91	3.0	270	810	173,705	3.0	270	810	90,141	263,846
11/14/91	3.0	570	1,710	175,415	3.0	570	1,710	91,851	267,266
11/15/91	3.0	525	1,575	176,990	3.0	525	1,575	93,426	270,416
11/18/91	3.0	480	1,440	178,430	3.0	480	1,440	94,866	273,296
11/19/91	3.0	315	945	179,375	3.0	315	945	95,811	275,186
11/20/91	3.0	315	945	180,320	3.0	315	945	96,756	277,076
11/21/91	3.0	255	765	181,085	3.0	255	765	97,521	278,606
12/02/91	3.0	300	900	181,985	3.0	300	900	98,421	280,406
12/03/91	3.0	495	1,485	183,470	3.0	495	1,485	99,906	283,376
12/04/91	3.0	300	900	184,370	3.0	300	900	100,806	285,176
12/05/91	3.0	315	945	185,315	3.0	315	945	101,751	287,066
12/06/91	3.0	215	645	185,960	3.0	215	645	102,396	288,356
12/09/91	3.0	480	1,440	187,400	3.0	480	1,440	103,836	291,236
12/10/91	3.0	390	1,170	188,570	3.0	390	1,170	105,006	293,576
12/11/91	3.0	435	1,305	189,875	3.0	435	1,305	106,311	296,186
12/12/91	3.0	410	1,230	191,105	3.0	410	1,230	107,541	298,646

TABLE SW-F.1
1991 PUMPING DATA FOR DM 201 AND DM 201-OB1

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DATE	DM 201 LONG-TERM PUMPING DATA				DM 201-OB1 LONG-TERM PUMPING DATA				TOTAL VOLUME PUMPED FROM DM201 & DM201-OB1
	ESTIMATED PUMPING		ESTIMATED	ESTIMATED	ESTIMATED PUMPING		ESTIMATED	ESTIMATED	
	RATE	MINUTES	VOLUME	CUMULATIVE	RATE	MINUTES	VOLUME	CUMULATIVE	
	(GPM)	PUMPED	PUMPED	VOLUME PUMPED	(GPM)	PUMPED	PUMPED	VOLUME PUMPED	
12/13/91	3.0	415	1,245	192,350	3.0	415	1,245	108,786	301,136
12/16/91	3.0	230	690	193,040	3.0	230	690	109,476	302,516
12/17/91	3.0	460	1,380	194,420	3.0	460	1,380	110,856	305,276
12/18/91	3.0	480	1,440	195,860	3.0	480	1,440	112,296	308,156
12/19/91	3.0	490	1,470	197,330	3.0	490	1,470	113,766	311,096
12/20/91	3.0	240	720	198,050	3.0	240	720	114,486	312,536
12/23/91	3.0	450	1,350	199,400	3.0	450	1,350	115,836	315,236
12/24/91	3.0	270	810	200,210	3.0	270	810	116,646	316,856
12/26/91	3.0	435	1,305	201,515	3.0	435	1,305	117,951	319,466
12/27/91	3.0	345	1,035	202,550	3.0	345	1,035	118,986	321,536
12/30/91	3.0	375	1,125	203,675	3.0	375	1,125	120,111	323,786
12/31/91	3.0	350	1,050	204,725	3.0	350	1,050	121,161	325,886